USAID Sustainable Landscape Assessment for India

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Challenges and Opportunities

for Implementing REDD+

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ACKNOWLEDGMENTS

USAID Sustainable Landscapes Assessment Team

Mr. Gregory Garbinsky, Assessment Team Leader
Senior International Development and Disaster Program Specialist/Advisor
US Forest Service /International Programs

Ms Rebecca Butterfield, Ph.D
Senior Forestry Advisor
USAID/EGAT/NRM

Ms Toral Patel-Weynand, Ph.D
Senior Forest Research Advisor,
US Forest Service/Research and Development

Ms Elizabeth Lebow, Ph.D
Asia-Pacific Program Specialist
US Forest Service/International Programs

Mr Vinod Sharma
Professor, Disaster Management and Environment
Nodal Officer, Department of Science & Technology
Indian Institute of Public Administration

Ms Emily Shelton
Environment Officer
USAID/India

Ms Shakun Suhag
Assessment Team Logistics

LIST OF ACRONYMS

ATREE: Ashoka Trust for Research in Ecology and the Environment
CAMPA: Compensatory Afforestation Fund Management and Planning Authority
CDM: Clean Development Mechanism
CEE: Centre for Environment Education
CIFOR: Centre for International Forestry Research
DFID: Department for International Development
EPA: US Environmental Protection Agency
EU: European Union
FAO: Food and Agriculture Organisation of the United Nations
FDA: Forest Development Agency
FPC: Forest Protection Committee
FRA: Forest Rights Act
FSI: Forest Survey of India
GHG: Green House Gas
GIM: Green India Mission Strategy
GoI: Government of India
GTZ: German Society for Technical Cooperation
ICFRE: Indian Council of Forestry Research and Education
ICRAF: International Centre for Research in Agroforestry
IFS: Indian Forest Service
IGNFA: Indira Gandhi National Forest Academy (IGNFA)
IIFM: Indian Institute of Forest Management
IIPA: Indian Institute of Public Administration
IIRS: Indian Institute of Remote Sensing
INCCA: Indian Network of Climate Change Assessment
ISRO: Indian Space Research Organisation
JFMC: Joint Forest Management Committee
JICA: Japan International Cooperation Agency
LEDS: Low emissions development strategy
MoEF: Ministry of Environment and Forests
MRV: Measurement, Reporting and Verification
NABARD: National Bank for Agricultural and Rural Development
NAEB: National Afforestation and Eco-Development Board
NAP: National Afforestation Programme
NAPC: National Action Plan on Climate Change
NASA: National Aeronautics and Space Administration
NATCOM: National Communications of India
NCP: National Carbon Project
NFI: National Forest Inventory
NFP: National Forest Policy
NGO: Non-Government Organization
NIMS: National Inventory Management System
NNRMS: National Natural Resource Management System

NRDC: Natural Resources Defense Council
NREGA: National Rural Employment Guarantee Act
NTFP: Non-timber Forest Products
ODI: Overseas Development Institute
PISFR: Pre Investment Survey of Forest Resources
REDD: Reducing Emissions from Deforestation and Forest Degradation
REDD+:   Reducing Emissions from Deforestation and Forest Degradation including Carbon
             Stock Enhancement
SDC: Swiss Agency for Development Cooperation
TERI: The Energy and Resources Institute
TOF: Trees outside forests
UNDP: United Nations Development Programme
UNEP: United Nations Environment Programme
UNFCCC: United Nations Framework Convention on Climate Change
USAID: United States Agency for International Development
USFS: United States Forest Service
USG: US Government
USGS: United States Geological Survey
WB: The World Bank
WII: Winrock International/India
WWF: World Wildlife Fund

EXECUTIVE SUMMARY

Background

Under the U.S. Government's strategy to *reduce carbon emissions from deforestation and forest degradation and enhanced sequestration, through afforestation, conservation and sustainable management of forests (REDD+),* the US pledged worldwide investments of $1 billion for REDD+ objectives (Copenhagen, December 2009). The US Agency for International Development's (USAID) bilateral investments come from the Sustainable Landscapes pillar of the Global Climate Change budget, and from those biodiversity programs that also have climate change objectives. The overall objective of this pillar of USAID is to help developing countries meet their commitments to the Copenhagen Accord and transition from current trends in emissions from deforestation and forest degradation to a future state where emission levels are reduced and/or forest carbon stocks increased, while supporting economic growth.

Within the Copenhagen Accord framework, REDD+ aims to reduce the long-term global trajectory of forest-related emissions through a complementary set of REDD+ country commitments and external financing for emissions reductions. The USG is committed to helping set up an international REDD+ framework and helping countries participate and gain access to international financing and technical assistance. At the same time, domestic commitments by REDD+ countries are central to success.

India has experienced major deforestation in the twentieth century and beginnings of this century mainly due to agricultural expansion, urbanization, and commercial extraction. The country is promoting afforestation and reforestation on an unprecedented scale and is one of the few developing countries in the world where the forest cover is increasing. India has more than doubled its budget for forestry in 2009 to USD 1.85 billion to increase the capacity of frontline forestry personnel, improve forestry infrastructure and control forest fires.

A U.S.–India Memorandum of Understanding to Enhance Cooperation on Energy Security, Energy Efficiency, Clean Energy and Climate was signed in late 2009. Among the joint initiatives for increased cooperation it specifies in priority initiative "d" that the two countries will cooperate on:

> *Reducing emissions from land use, including deforestation: cooperation on forests and land use, including reducing emissions from deforestation and forest degradation and enhanced sequestration, through afforestation, conservation and sustainable management of forests.*

The Assessment

Within this context, in June 2010, USAID launched a sustainable landscapes assessment in India to identify the country's preparedness and readiness to implement REDD+ activities and initiatives. The seven person technical assessment team, composed of technical experts from USAID and the US Forest Service and two Indian technical and logistics coordinators, conducted a three week assessment in-country holding stakeholder workshops and arranging individual meetings with Government of India (GoI) officials particularly in the Ministry of Environment and Forests (MoEF),

donors, NGOs, UN, USAID/India and other partners and stakeholders. The purpose of the assessment, whose findings are summarized in this report, was to provide USAID/India with an analysis of opportunities and challenges related to Reduced Emissions from Deforestation and Forest Degradation (REDD) including the role of increasing forest carbon stocks (REDD+ in the Copenhagen Accord) in India in order to make strategic programming decisions for the incoming USAID Sustainable Landscapes funding.

The assessment examined national level priorities, forest inventory and monitoring aspects, community level forestry perspectives, enabling environment and incentive structures, REDD+ financing, institutional capacity and capacity-building needs, and what role donors, NGOs and other stakeholders are taking related to REDD+ readiness. Since USAID/India has not recently had a significant forestry or natural resources portfolio the assessment looked carefully at the current situation and the implications for USAID as it reengages in the natural resource management sector. The assessment is not designed to be a final, comprehensive activity but to deliver findings and identify opportunities and options which will serve as the first step of a multi-stage process leading to a more detailed program design.

The Assessment Team conducted workshops and meetings in Washington, DC prior to departure and in-country in New Delhi and Dehradun, India.

Summary of Relevant REDD+ Needs in India and Opportunities for USAID/India Sustainable Landscapes Programming

Donors with a history of forestry programs in India emphasized the need to invest significant resources at the national level. Most forests are state-owned and all forestry projects must include state government cooperation. However, forestry policies and projects are still centrally driven, and without significant engagement at the national level it is difficult to scale up the impact of state level programs to apply lessons and success to other regions.

Green India Mission (GIM)

The National Mission for a Green India (GIM) is one of eight missions under the GoI National Action Plan on Climate Change (NAPCC). It recognizes that climate change will affect and alter the distribution, type and quality of the natural resources of the country and the associated livelihoods of the people.

It aims for an additional (over current government programs) 10 million ha with increased forest cover over the next 10 years[1]. It offers an opportunity for engagement between USAID and the Ministry of Environment and Forests and sets the tone for a common dialogue and partnership on areas of common understanding and within the Sustainable Landscapes definition.
Keeping this GoI perspective in mind as well as the operational parameters under the Sustainable Landscapes pillar of USAID and the U.S. – India Strategic Dialogue, options are outlined below for

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[1] This assessment report is based on the first draft of the Green India Mission document which was released in May 2010. Since then it has been revised, and approved by the Prime Minister's Council on Climate Change in February 2011. As per the revised draft, the Mission aims to increase forest and tree cover in 5 million ha (covering forest and agricultural lands) and improve quality of forest in another 5 million hectares.

potential USAID engagement with the GoI on REDD+ issues under a broad science and technical collaboration umbrella. The GoI requests for USG assistance are focused on scientific exchange and technical collaboration rather than traditional development support reflecting a new focus and relationship with the Indian Government and partners. Therefore, the options presented below are science and technology-oriented with related capacity-building. Field opportunities also exist by applying science to field studies of new methodologies and technical packages.

Options are presented, in priority order, by overarching thematic group: **National REDD+ Dialogue and Actions; Development of Reference Baselines; and Enhancing Multiple Forest Values.** Related capacity-building activities would be within each group as presented in more depth in the body of the report.

Thematic Group 1: National REDD+ Dialogue and Actions

The about-to-be formed REDD+ Cell in MoEF is an opportunity for USAID/India to collaborate and influence REDD+ policies and mechanisms at the national level. The role of this cell is to create awareness and capacity building on the REDD+ process for all stakeholders and to build the REDD+ strategies and policies. It will also establish guidelines on MRV and benefit sharing mechanisms (MoEF, GIM 2010). Policies, directives and targets will flow down to state and local levels. Through close collaboration with the REDD+ Cell, pilot efforts at the local level will be sanctioned and recognized at the national level with a greater chance of dissemination and mainstreaming.

Some suggested options for supporting this National REDD+ Dialogue may include:

- **Partner or collaborate with the new REDD+ Cell of the MoEF**

- **Supporting a non-government platform for REDD+ dialogue**

Thematic Group 2: Development of Reference Baselines for REDD+ Activities

Credibility for REDD+ credits will ultimately depend on the credibility of the measurement, reporting and verification (MRV) systems. India has an advantage over many countries with its long standing forest inventory and survey data. However, REDD+ poses many new challenges which will require new technologies, methods and innovative means to increase accuracy while holding down costs.

The GoI recognizes the need to establish credible national baselines and methodologies associated with the GIM and REDD+ activities in India. These are fundamental issues that will need addressing in order to develop sound national baselines through improvement of GoI's National Forest Inventory (NFI).

Some suggested options (stand alone or as bundled elements depending on funding levels) under this Group 2 may include:

- **Improved sampling design**

- **Integrating remote sensing and ground level measurements**

- **Developing cost effective tools and technologies for the NFI and local levels**

- **Capacity-building**

- **Improving communication, information and data networks**

Thematic Group 3: Enhancing Multiple Forest Values

From a climate perspective, the goal of REDD+ is to increase CO2 sequestration through increases in carbon stocks.   "Farming" carbon or payments for carbon alone will not be sufficient motivation for communities or individuals to forego harvesting, protect trees or plant more. There is still uncertainty as to the form that global carbon markets will take when these issues have been negotiated and a global mechanism is put in place. Therefore, programs that promote additional forest values (water, fodder, fuel, medicine, timber, wildlife) in addition to carbon, will have a greater chance of succeeding. Income generation will be an important incentive to increase carbon stocks in India as well as promote access to basic necessities.

Empirical evidence supports that community involvement in natural resources management improves both forest condition and livelihoods. India has decades of experience with community participation in forest management and afforestation projects To achieve its ambitious Green India Mission goals, India will be dependent on community participation and will need to innovate further to discover the spark that will motivate deeper community engagement. The "spark" will likely take different forms in different situations. With over 100,000 Joint Forest Management Committees (JFMCs) in India, there is a solid base of experience from which to build.

Some options under Group 3 may include:

- **Enhancing GIM forest carbon technology packages (both from a bio-physical and incentives perspective)**

- **Quantifying multiple values and products from forests in collaboration with JFMCs, state foresters and national institutions**

- **Enhanced community benefits through field testing of new participatory methods**

- **Capacity building at national, state government and local levels**

More details on the three groups outlined above are in the findings of this report and culminate in **Section 8** in the **Summary of REDD+ Needs and Opportunities in India and Options for USAID/India.**

As stated earlier, this assessment report is the first stage of a multi-stage process to analyze the challenges and opportunities for implementing REDD+ activities in India in order to develop and design a Sustainable Landscapes program for USAID/India. In a country as large and complex as India, we cannot assume that we have examined all elements fully within the three week time span of this assessment mission. However, we have utilized our best judgment and analysis of the information and data we gathered while incorporating the different experiences, perspectives and lessons learned from the different stakeholders we met and documentation and literature we reviewed.

The further elaboration of a design for this program will no doubt evolve over time with additional experiences of USAID staff, building on the synergies with current and planned programs and the increased dialogue and cooperation with the Ministry of Environment and Forests (MoEF).

SECTION 1 – INTRODUCTION
USAID's Sustainable Landscapes Funding and the USG REDD+ Strategy

US investments under the $1 billion REDD+ commitment made at Copenhagen contribute to the objectives of the US Government's (USG) REDD+ strategy. In terms of multilateral instruments, the US portfolio includes contributions to the World Bank's Forest Carbon Partnership Facility, the Forest Investment Program, and the Global Environment Facility. USAID's bilateral investments come from the Sustainable Landscapes pillar of the Global Climate Change budget, and from those biodiversity programs that also have climate change objectives. The overall objective of the Sustainable Landscape Pillar is to help developing countries meet their commitments to the Copenhagen Accord and transition from current trends in emissions from deforestation and forest degradation to a future state where emission levels are reduced and/or forest carbon stocks increased, while supporting economic growth.

Within the Copenhagen Accord, REDD+ aims to reduce the long-term global trajectory of forest-related emissions through a complementary set of REDD+ country commitments and external financing for emissions reductions. Initial external financing focuses on building country capacity and demonstrating how to achieve results, but the bulk of the financing will eventually be payments provided upon delivery of the emissions reductions. The USG is committed to helping set up an international REDD+ framework and assisting countries participate and gain access to international financing and technical assistance. At the same time, REDD+ countries domestic commitments are central to success. Long-term sustainability of carbon storage in forests requires domestic policy reform that improves the ability to track and enforce emissions reductions and sets up economic incentives and financing streams that will persist after initial international investments.

USG Objective 1: REDD+ Readiness: Helping countries become ready to participate in pay-for-performance programs and take complementary domestic actions.

This objective supports country readiness for both domestic actions and pay-for-performance opportunities, in the context of ambitious national REDD+ plans. Actions under this REDD+ readiness objective will build national capacity and support creation and implementation of national policies that enable and create incentives for local forest mitigation results. USG investments will include the following types of activities:

- Support for host countries' development of REDD+ strategies, in particular those being developed as part of an economy-wide low emissions development strategy (LEDS).
- Support for the development of national forest carbon inventories and reference scenarios that are linked to robust national greenhouse gas inventories.
- Promotion of national standards and systems for effective environmental and social safeguards for REDD+ activities.
- Provision of technical assistance on national legal, regulatory, and financial structures necessary for participation in any future carbon market; for example, to manage benefit-sharing from results-based payments.

- Implementation of readiness elements within a country's national REDD+ strategy, if a strategy exists. This might include strengthening the aspects of national forest governance, national technical management capacity, and national land and tree tenure policies that are directly necessary to achieve emissions reductions and sequestration at scale.
- Support to help countries design and carry-out national level policy reforms that are part of low emissions development strategies and change economic incentives toward reduced net emissions. Examples include policies for payments for ecosystem services, changes to subsidies and tariffs to facilitate decreased net emissions from land use, national land use and land planning especially related to reducing agricultural pressures on forests, and concession and logging reforms.

USG Objective 2: REDD+ Demonstration: Achieving cost-effective and sustainable net emissions reductions.

Investments under this objective seek to achieve, or identify and demonstrate best practices for decreasing net forest emissions that are cost-effective and at a significant geographic scale. The focus will be on sub-national demonstrations designed to move a country toward national actions and results. Demonstration activities should have explicit linkages with ongoing national REDD+ readiness efforts. Financed activities may include:

- REDD+ readiness activities at the local government level such as capacity building and local policies and practices. This includes sub-national REDD+ strategies, benefit sharing and safeguards systems, emissions inventories, and land use planning and monitoring.
- Support for large-scale pilot activities that promote economic development, verify emission reductions, and catalyze private-sector investment. These activities should lead to real, sustainable, and cost-effective emission reductions, have the ability to be scaled up, and contribute to sub-national or national REDD+ strategies.
- Support for emissions reduction demonstrations at smaller scales to test approaches that are designed to be scalable to achieve significant emissions reductions, thereby building political will for larger programs or reforms.
- Pay-for-performance pilot projects and funds, for example ex-post payments for reduction of emissions.
- Demonstrations of how local activities feed into and are accounted for in national plans. Demonstrations need to test the approaches identified through the REDD+ readiness process. Demonstrations generate important lessons and political will and should result in changes to strategies and policies to make them more ambitious and effective.

Purpose and Scope of Assessment

The purpose of this assessment is to provide USAID/India with an analysis of opportunities and challenges related to REDD including the role of increasing forest carbon stocks (REDD+) in India in order to make strategic programming decisions for USAID Sustainable Landscapes funding. The assessment has examined national level priorities, criteria for geographical areas to focus in, and what role other donors are taking on related to REDD+ readiness.

Since USAID/India has not recently had a significant forestry or natural resources management portfolio the assessment has looked carefully at potential partners, options, activities, and the implications for USAID as it reengages in the natural resource sector. Options presented in this report will, to the extent possible, take into account the resources available to USAID, agency-wide

priorities, existing USAID/India strategic objectives and programs, in addition to the specific country context. This assessment serves as the first step of a multi-stage process which will lead to a detailed program design to be conducted by a USAID design team.

Assessment Methods

The USAID Assessment Team composed of various forestry technical subject matter experts and international development management experts, conducted this assessment in-country from the period June 12 to July 2, 2010. In order to gather as much information, lessons learned, perspectives and experience in the Indian context, the Assessment Team used a variety of methods for gathering information and collecting data.

Consultative Stakeholder Workshops

The Assessment Team conducted four separate stakeholder workshops in order to engage as many relevant stakeholders as possible given the short timeframe of the assessment.

The first half-day stakeholder workshops was held in New Delhi on June 15 with a group of 18 India-based NGO representatives with experience of working in natural resources, forestry or REDD related activities in India. The World Café workshop method was utilized, which allowed interactions, conversations and dialogue in small groups around the four main themes: Natural Resources Management, Enabling Environment (Policy/ Governance), Social/Community Forestry and REDD Finance aspects.

The second half-day stakeholder workshop was held in New Delhi on June 16 with a small group of international donors and international organizations with experience and work in natural resources/forestry or REDD-related activities and programs in India. Given the small size of the group a roundtable discussion was used to solicit perspectives and experiences of the various participants.

A third half-day workshop was held with 38 key Indian forestry officials at the Indian Council of Forestry Research and Education in Dehradun on June 21. Similar to the first workshop, the World Café method was used around the same themes in order to allow participants to engage in discussions and dialogue on various aspects of REDD+ and to share perspectives.

The fourth half-day workshop was held on June 25 at the Ministry of Environment and Forests (MoEF) in New Delhi. Participants at this workshop were several foresters from the NE States and some members of the MoEF senior management. An informal open discussion was utilized to gather this viewpoint.

Individual Meetings

With the assistance of the Indian Onsite Coordinator/Consultant, the Assessment Team organized many individual meetings with various other donors (e.g. World Bank, JICA, and GTZ), International Organizations (UNDP), NGOs (e.g. Winrock International India, TERI) and various experts and current and former government officials (retired) with long experience in forestry and natural

resources. In addition, the Team met with various staff of the USAID/India Mission, and State/OES on several occasions to discuss the assessment and gather additional insights and perspectives.

Document and Literature Review

Prior to and during the conduct of the Assessment mission in India, the Team gathered various official documents and other literature through USAID, the Government of India, public domain, Internet and other public sources. During the course of this assessment the Team reviewed and referenced relevant documentation in their discussions (e.g. the draft Green India Mission Strategy) in order to get a better understanding and to obtain clarifications.

SECTION 2 - FORESTS IN INDIA SUMMARY

Overview

India is one of the "megadiverse countries" which harbor 60-70 percent of the planet's biodiversity. Covering an area of 3.28 million sq kilometers, India is the seventh largest country in the world. The mainland of India extends between 8° 4 ' N and 37° 6' North Latitude and 68° 7 ' and 97° 25 ' East Longitudes. For ease in managing the countries resources, the country is stratified into 14 physiographic zones (Section 4, Table 3) based on, climate, vegetation, and soil. The forestry sector has traditionally been one of the most organized sectors in India with more than 140 years of scientific input into forest management. However, like other sectors it has been affected by several factors including a rapid increase in human and livestock population, insufficient infrastructure, inadequate investment and diversion of forestland for agriculture and development activities. Other problems, somewhat unique to the forestry sector, include inadequate public awareness of multiple functions of forests, under-valuation of forest contributions to GDP, technological gaps, insufficient funding and lack of adequately trained frontline forest staff.

Sustainability of forest ecosystems is an essential component of environmental conservation efforts and any degradation of forests will have an adverse impact on water resources, agriculture, biodiversity, environment, climate change and human health in addition to impacting subsistence livelihoods of forest-dependent communities. With about 2.5% of world's geographic area and only 2% of global forest cover, India supports 16% of the world's human population and 18% of its cattle population. About 41% of the forest cover has already been degraded and many "dense" forests are also being impacted. The need for fuelwood, timber and other forest products   exceeds the country's ability to sustain quality forests, a problem further compounded by livestock grazing that negatively impacts forest regeneration and productivity. The productivity deficit is being met currently from the agroforestry sector and imports. However, the deficit is anticipated to further increase in the future with the rising population pressures, accelerated economic growth and rise in literacy levels.

National Forest Policies and Responses to Challenges in the Forestry Sector

The National Forest Policy (NFP) of the country was revised in 1988 with the principal aim of achieving environmental stability and ecological balance. The NFP manages for multiple uses especially since the availability of Non-timber forest products (NTFPs) and value-added products are vital for the economy of 350-400 million rural people living in and around forests. The NFP gives priority to the sustenance and livelihood needs of forest-dependent communities, particularly tribal populations and also involves them in the protection, conservation and management of forests. India's forests are primarily considered a social and environmental resource with more than 22 million hectares of forests assigned to the communities under the Joint Forest Management Programme with benefit-sharing mechanisms on the principles of care and share. However, at the filed level, there are problems associated with translating these policy intentions into actions.

The pressure on India's forests continues to be very high, with more than 200 million people being solely dependent on forests for their livelihood. Socio-economic pressures result in actions that lead to forest degradation and unsustainable use. Work done by UNDP, FAO, European Commission and others (Gordon and Berry, 2000; Patel-Weynand and Vogt 1999; Patel-Weynand, 1998) in developing countries indicate that forests can be sustainably managed to alleviate poverty particularly in the forest fringe areas. To address the issue of poverty alleviation in forest-adjacent areas and to promote sustainable use, India has made an effort to recognize the tenure rights of tribal groups to forests with the issuance of guidelines to the state governments in 1990. India has also taken a milestone step to provide occupation and habitation rights to forest-dependent communities living in and around forests through the Forest Rights Act (2006) addressing rights to protect, conserve and regenerate forests. The empowerment of community groups is a key step to improving the socio-economic status of forest-dependent communities.

While India has strong legal, policy and institutional frameworks for the sustainable development of forests in the country, much work is required to implement these policies well at the ground level. It is encouraging to note that the institutional framework is shifting from a regulatory to a more participatory mode of administration, intended to be more people-oriented in future. The Forest Conservation Act (1980) is a progressive forest conservation legislation which puts severe restrictions on the diversion of forest land for non-forestry purposes and commits to protecting, regenerating and growing India's forests.

On the biodiversity protection and conservation front, the Wildlife Protection Act (1972) provides the legal framework for wildlife conservation in the country. India is also in the process of amending the Indian Forest Act (1927) with respect to the people-oriented approach of the National Forest Policy 1988. The newly enacted Schedule Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, (2006) (a.k.a Forest Rights Act) assigns individual rights to cultivated land in forestland and community rights over common property resources. India recently reviewed its forest-related policies and legislations through the National Forest Commission. The Commission has also given certain recommendations for sustainable development of forests although there are currently no suggestions for any amendments to the National Forest Policy which would be necessary for appropriate actions on forest lands.

There are major tasks before the country to rehabilitate degraded forests, increase their productivity, augment the contribution of forests towards poverty alleviation of forest-dependent people, and extend the area under forest and tree cover to 33%. The lack of capacity in the natural resources management arena in the forest dependent communities and inadequate investment in the forestry sector are the big challenges for the country to overcome in the implementation of sustainable forest management. For example, overgrazing is currently causing degradation to the forests. A separate grazing policy is urgently needed to address livestock impacts on forest lands if reforestation and rehabilitation targets are to be met.

The GoI is working towards creating enabling environments (See Section 5) to help meet its targets in the future, although progress is slow as policies take time to trickle down to the local levels. It has taken steps for rationalization of regulatory and policy constraints for trees grown on private land potentially contributing 85% of the tree cover needed to achieve the 33% forest and tree cover target. Another major task ahead for the GoI is to bridge the domestic supply and demand gap for wood and wood products. India is and will be a big market for wood and wood-based products and its demands are projected to increase 3-4 fold by 2020 (Annual Report Ministry of Environment and

Forests 2009). India's forests are slated to meet the socio-economic needs of the people living in and around forests and ecological security of the nation in the future, if policies are translated into action.

The forestry sector is impacted directly by the policies (or lack of policy enforcement) in other sectors including agriculture, rural development, *panchayati raj*[2], education, energy, and water resources and indirectly from a climate change perspective by policies related to fossil fuel use, chemical, fertilizers, and other industrial and commerce policies. An example of a recent policy affecting forests and livelihoods is the National Policy for Farmers (2007). This policy reform seeks to improve the socio-economic status of the rural populations, particularly people living in and around forests, with the inclusion of agroforestry and NTFPs within the formal definition of farming.

The forestry sector in India is embedded in a complex matrix. India is looking to overcome the challenges of high human and livestock population pressures, changes in demographic balance, poverty in forest fringe areas, high economic growth particularly in urban areas and impacts of climate change, along with policy and legislative interventions and capacity building at all levels within the sector. It is clear that the forest dependent communities will play a crucial role in the implementation of sustainable forest management and increased productivity in the future.

Changes in Forest Cover

India started its biennial assessment of forest and tree cover in 1987. The Forest Survey of India (FSI), an organization under the MoEF is responsible for monitoring the forest and the tree cover in the country. The operational system for wall-to-wall mapping of India's forest cover involves interpretation of over 300 satellite images, each covering about 20,000 km^2. Tree cover assessment is a sampling based exercise using data from about 10,000 sample plots. The forest cover assessed is classified into three canopy density classes:

- Very Dense Forest (VDF) with canopy density more than 70%.
- Moderately Dense Forest (MDF) with canopy density between 40-70%.
- Open Forest (OF) with canopy density between 10-40%.
- Scrub, which is degraded forest land with canopy less than 10%, is not considered as forest cover.

The status of forest cover by year of assessment (1987 – 2009) based on FSI data is displayed in Table 1 with additional descriptive information following in paragraph below.

The forest cover of India has increased from 63.33 mha in 1997 to 69.09 mha in the current assessment, an increase of 5.76 mha (9.09%)**.** Additional tree cover outside recorded forests is

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[2]   As defined in the India Constitution, the panchayat raj is a political system used in India (also prevalent in Pakistan, and Nepal). "Panchayat" literally means assembly (yat) of five (panch) wise and respected elders chosen and accepted by the village community. Traditionally, these assemblies settled disputes between individuals and villages.

2.82% of geographical area of the country, yielding total forest and tree cover of 23.84% in the country. Some key observations below provide an illustrative look at forest cover in India:

- Total forest cover reported in the 2009 FSI annual report is 690,899 sq.km which is 21.02% of the geographical area of the country; very dense forest (2.54%), moderately dense forests (9.71%), and degraded or open forest (8.77%).
- 88% of forest cover needs attention for density improvement
- Since boundaries of most of the recorded forest area are not digitized it is not possible for FSI to project the increase or decrease of forest cover in certain areas. The comprehensive digitization of forest boundaries is a very critical gap in the assessment of forest cover in India.
- A major reason for the increase in forest cover since1999 is due to research and technology improvements for reforestation, particularly in genetics, plant breeding, selection of fast growing species and improved silvicultural practices.
- Digitization of forest boundaries, agroforestry and density improvement of forests are key activities that need to be addressed under REDD+ strategies.

Table 1. Status of India Forest Cover by Year of Assessment (1987 – 2009)

Year of Assessment	Forest Cover Area in km and (% of total geographical area)	
First- 1987	640,819	(19.49%)
Second- 1989	638,804	(19.43%)
Third- 1991	639,364	(19.45%)
Fourth- 1993	639,386	(19.45%)
Fifth- 1995	638,879	(19.43%)
Sixth- 1997	633,397	(19.27%)
Seventh- 1999	637,293	(19.39%)
Eighth- 2001	653,898	(19.89%)
Ninth- 2003	677,816	(20.62%)
Tenth- 2005	690,171	(20.60%)
Eleventh- 2009	690,899	(21.02%)

Volume of Growing Stock

According to the 2007 modified assessment (approximately 50,000 sample plots) by FSI, the volume of growing stock in India's forest and trees outside forests (TOF) is 6,098 million cubic meters. Growing Stock based on about 50,000 sample plots is presented below and provides an illustrative example of carbon stocks in the forestry sector in India.

Table 2. Growing Stock of Forest and Trees Outside Forests (TOF) in India (FSI, 2007)

Canopy	Growing Stock (in million m^3)
Forests	4,499 (73.8%)
TOF	1,599 (26.2%)
Total	6,098

SECTION 3 - CURRENT REDD-RELATED ACTIVITIES AND STAKEHOLDERS IN INDIA

Government of India Priorities

National Mission for a Green India

The Government of India (GoI) recently released a draft version of the National Mission for a Green India (GIM) that calls for the rehabilitation/afforestation of 10 million hectares of land divided among various forest types and agricultural lands (in addition to the 10 million which is likely to be treated by state forest department and other agencies). This document represents India's REDD+ strategy (MoEF, personal communication) and calls for a REDD+ coordination cell in MoEF. Since India does not consider deforestation as a threat to their forests, and since overall forest cover in India is increasing, GoI is mainly interested in the "plus" component of REDD+.

Scientific Collaboration with MoEF

Minister Jairam Ramesh, Secretary Vijai Sharma, and multiple staff of MoEF have expressed great interest in scientific collaboration with the United States on REDD-related science, including:

- Management of forest productivity in both natural and man-made forests, with an emphasis on increasing productivity, especially in agroforestry systems
- Mapping of forest cover
- Forest inventory and monitoring
- Estimating carbon potential of different forest types, given India's high ecosystem diversity
- Improvement of genetic stocks for afforestation and reforestation purposes

Criteria for REDD+ Pilot Projects

While expressing strong interest in scientific exchange, MoEF is open to field testing different methodologies and management interventions and their effect on carbon sequestration through pilot studies. The criteria given by MoEF for selecting field pilots include:

- Highly successful Joint Forest Management Committee (JFMC) - see "Community Forestry" section below
- High carbon potential, based on forest type
- High population pressure and therefore threat to the forests

MoEF would assist in identifying sites that meet these criteria.

Donor Activities

Overview

While many donors in India have been or are currently involved in climate change and forestry activities, as of July 2010, none that the assessment team met with are working directly on REDD+ programs. The main donor in the forestry sector is JICA, with sustainable forest management projects in eleven states. Others don't have exclusive forestry programs, but support programs which among other issues also deal with forestry issues.

Donor Coordination

In such a large, diverse country, donor coordination of activities is critical and there are several inter-donor organizing structures in climate change and forestry, including:

- **The Climate Change Cluster.** This group, coordinated by UNDP, meets regularly to discuss climate change related activities in India. All donors and NGOs are welcome.
- **Climate Change Action Plan Support.** World Bank, GTZ, UNDP, and DFID are assisting States in preparing action plans, which include forestry components. They have divided up the states and are coordinating content.
- **Forestry Donor Forum** (no longer active since most donors have decreased their forestry programs)

Other Relevant Donor Activities

Food and Agriculture Organization (FAO)

FAO has two major engagements with GoI on forestry: 1) creation of a forest policy center; and 2) Non-timber forest products (NTFPs) inventory. They are working with the government to create an independent national center for forest policy and research that would be based in Dehradun. Some priorities of the center would be to integrate forestry policy across multiple sectors and to engage with civil society. For the NTFP inventory, FAO is working to strengthen the inventory in terms of scientific information and harvesting practices of NTFPs.

European Commission (EU)

The EU funded a project called the "Haryana Community Forestry Project" from 1999 to 2008 in Haryana state. Part of this project became the first small-scale afforestation project in the world to be certified by the Clean Development Mechanism (CDM). The project also included training village management committees in natural resources management and increasing women's and minorities leadership and participation.

United National Development Program (UNDP)

UNDP organizes and chairs the Climate Change Cluster (see above). They are working with five states on Climate Change Action Plan support. They plan to support India in implementing the Green India Mission.

Swiss Agency for Development and Cooperation (SDC)

SDC has been involved in NRM activities in India since the 1970s. They have worked with Joint Forest Management (JFM, see "Community Forestry" Section 6) in Rajasthan and Maharashtra and have plans to develop adaptation and REDD+ activities in the Himalayas.

UK Department for International Development (DFID)

DFID had a large forestry program working with state governments in three states on forest sector governance, sustainable forest management, and livelihood enhancement. These projects finished in 2005. They currently have rural livelihood programs in Bihar, Madhya Pradesh, and Orissa that have a forestry component, and have just recently exited from livelihood projects in West Bengal and Andhra Pradesh. Half of their portfolio is focused on national level programs. This is critical, they say, since most policies are pushed from the center, including forestry.

World Bank (WB)

WB has worked for three decades with MoEF on forestry, but they currently have no active programs. They just funded a forest inventory in Andhra Pradesh with the state government.

Japan International Cooperation Agency (JICA)

JICA has forestry programs in eleven states– Uttar Pradesh, Haryana, Punjab, Tamil Nadu, Karnataka, Sikkim, Himachal Pradesh, Tripura, Rajasthan, Orissa, and Gujarat. Working in coordination with state governments, most projects have an afforestation and livelihood focus and are working with Joint Forest Management Committees. In addition to the state projects, JICA is working with MoEF on capacity building of forest guards and forest officers in all states. They are also supporting infrastructure improvement at state forestry offices.

GTZ

GTZ is working with MoEF on a climate change adaptation program in rural areas of four states- Rajasthan, Madhya Pradesh, West Bengal, and Tamil Nadu. They are doing vulnerability assessments at the district level and looking at technical adaptation solutions, including forestry-related components.

NGO Activities

Many NGOs are active in natural resources management but REDD+ activities are new to India and limited at this point. Below is a partial list of some relevant NGO activities.

WWF/India

WWF/India, through their Critical Landscapes program, is strengthening community capacity in resource management in multiple states in India, including working with Community Conservation Areas (CCAs, see Section 6 "Community Forestry) in Arunachal Pradesh. They are also strengthening the capacity of frontline foresters for wildlife monitoring and crime control. The USAID Sustainable Conservation Approaches in Priority Ecosystems (SCAPES) program is supporting their work in Sikkim on capacity building for Forest Department personnel.

Winrock International, India (WII)

WII is independent from Winrock International and run their own programs and funding. They have a significant history in the forestry sector in India and have partnered with DFID, Ford Foundation, World Bank, IUCN, USAID and others in the past on forestry-related projects. Previously they ran a stakeholder's forum for discussing Joint Forest Management. It is no longer active but newsletters and other publications are still available on the website at www.rupfor.org. Related to this forum they also organized a 2009 workshop called "Participatory Forest Management in India". Their current NRM portfolio includes adaptation, forest management, and biodiversity programs. Their forestry

programs focus on livelihood development, NTFPs, and JFM and they are active in Orissa and Madhya Pradesh. They also piloted PES projects in Himachal Pradesh and Madhya Pradesh involving small dams and water payments (Chetan et al 2007).

The Energy and Resources Institute (TERI)
TERI is a think tank and research-based organization with close ties to MoEF which include helping to conceptualize the Green India Mission. They have a Forestry and Biodiversity Group that conducts a variety of activities including: 1) participatory forest management programs in Tamil Nadu and Haryana; 2) policy research on JFM and other forest policies; 3) research on NTFP sustainable harvesting in Western Ghats; 4) research on carbon storage and increasing forest productivity, and 4) capacity building for communities and Indian Forest Service (IFS) officers.

Ashoka Trust for Research in Ecology and the Environment (ATREE)
ATREE is a research-based conservation organization that has on-going studies on adaptation and ecosystem services throughout India. They have adaptation studies in Tamil Nadu, Darjeeling, Kerala, and Karnataka. As an example, they are studying traditional capacity of farmers in Tamil Nadu to adapt to rainfall patterns and how that knowledge could be applied to adaptations for predicted climate change impacts on water. They are also studying ecosystem services in the Western Ghats and Himalayas, including a new project estimating carbon storage and sequestration in Sikkim ATREE is currently engaged in policy discussions on climate change and REDD+, with a focus on promoting policies that integrate community development and traditional knowledge with science-based solutions.

Other USG REDD-related Activities pertinent to India

US Forest Service REDD-related Activities

Eastern Himalayas Forest and Climate Change Program
The northeastern Indian states of Sikkim and Arunachal Pradesh are part of this US Department of State funded program, along with the countries Nepal and Bhutan. A regional workshop that is scheduled for early 2011 in Kathmandu will tentatively include participation by MoEF and relevant State-level FD staff. The main purpose of the workshop is to discuss forest inventory and data management for multiple uses, including carbon accounting, climate change adaptation, ecosystem services, and disaster preparedness. Also as part of this program USFS is providing modest support to WWF/India's climate change adaptation work in Arunachal Pradesh.

Bilateral forest inventory workshop
The **US Forest Service** complements the USAID and State funding it receives with in-kind staff support from its large network of domestic-based experts. A tentative workshop for US Forest Service and MoEF scientists to exchange technical information on forest inventory and monitoring is planned for 2011.

Other US Agency REDD+ related work

National Aeronautics and Space Administration (NASA) and US Geological Survey (USGS)

These agencies contribute unique resources in the form of satellite data (e.g. Landsat and Modis images), analyses, and software tools that are the backbone of most forest carbon inventories in developing countries. These free resources are complemented by some budgetary support for staff involvement in partnerships with USAID development programs.

US Environmental Protection Agency (EPA)

The EPA also contributes support for tools and staff involvement in partnership programs with USAID on building developing country capacity for national greenhouse gas inventories, particularly in the agriculture, land-use, and forest sector. These programs contribute to our REDD+ architecture objective because they build capacity and shared vision for robust emissions estimation, monitoring, and reporting.

SECTION 4 - FOREST INVENTORY AND MONITORING

Introduction

The Intergovernmental Panel on Climate Change (IPCC) fourth assessment report suggests that the land use sector has the potential to contribute about a third of the global GHG emissions reductions necessary to achieve the 450 parts per million carbon dioxide equivalent (CO_2e) target by 2020, while delivering positive development benefits. Pending resolution on the international negotiations, the urgent need to reverse current trends of tropical deforestation and the positive political momentum favors the establishment of an interim phase to accelerate action on REDD+. There is a growing consensus that as a country moves towards full scale REDD+ implementation, it will need to develop a REDD+ strategy and build measurement, reporting and verification (MRV) capacity (REDD+ readiness). Generally, the readiness phase is followed by implementation of national REDD+ policies and measures before full scale implementation (Streck et al. 2009). Of relevance to the USAID assessment of the REDD+ landscape in India, as in many other countries, support would need to begin with capacity building including the building of monitoring capacities and fostering of enabling environments for REDD+ implementation. Without prejudging the outcomes of the international negotiations on the issue, the science and technical portion of this assessment addresses areas that stakeholders, NGOs, the GoI and its forestry institutions have identified as key to helping India move forward with REDD+ implementation.

In the policy arena on REDD+, the Green India Mission (GIM) which is slated to be the GoI's REDD+ framework, essentially reflects the GoI's REDD+ thinking and strategy and aims to address REDD+ related issues in three broad areas: (1) Enhancing carbon sinks in sustainably-managed forests and other ecosystems, (2) Adaptation of vulnerable species/ecosystems to the changing climate, and (3) Adaptation of forest dependent local communities in the face of climate variability. Under the U.S.-India Strategic Dialogue on Climate Change, the Sustainable Landscapes pillar tracks closely with the first of the three GIM areas as a potential entry point for USAID to engage with the GoI in the natural resources management area broadly with specific emphasis on helping the GoI on enhancing carbon sinks under REDD+. In addition, although the other two areas deal with adaptation broadly, they have clear implications for REDD+ from a productivity enhancement and carbon sequestration standpoint.

In discussions and workshops that were the basis for this assessment, the GOI emphasized the need to engage on scientific and technical collaboration with USAID as a priority under the GIM. Specifically, the GoI would like to build reference baselines for potential REDD+ activities as well as collaborate on capacity building for frontline officers. Keeping these GoI needs in mind in moving towards a sustainable REDD+ landscape, this assessment's review of India's REDD+ readiness in forest inventory, monitoring and MRV specifically focuses on four areas:

- GoI's current national inventory system

- Information available for baseline deforestation/degradation

- MRV capabilities at the national and landscape scales

- Capacity needs at national and local levels in forest inventory and remote sensing for REDD+ purposes.

In addition, some of the issues under "adaptation" targeted by the GIM are addressed from an enhancing productivity and improving carbon sequestration perspective.

GoI's current national inventory system

India's National Forest Inventory (NFI) began with the preparation of Working Plans at the District level, with the use of aerial photographs for large-scale surveys beginning in 1965 under the UNDP/FAO funded Pre-Investment Survey of Forest Resources. At present, the GoI has an operational national forest inventory infrastructure with the Forest Survey of India (FSI) conducting a National Forest Inventory (NFI) on a two year cycle. The new NFI, designed and adopted by the FSI in 2002, is implemented across the fourteen physiographic zones (Table 3 below) for the assessment of growing stocks of forest and Trees Outside of Forests (TOF). Each two year inventory cycle covers 10 percent of the districts (60 districts) out of a total of 600+ districts country wide across these physiographic zones. A fairly detailed summary of the sampling methodology is available and indicates that considerable effort has gone into the planning and execution of the sampling design (ICFRE 2009; FSI 2009). However, based on discussions that were part of the USAID Assessment, as well as the USAID Assessment Workshops, there remain gaps that need to be addressed to improve the NFI to where it is able to provide carbon estimates consistently across the country, for a particular time frame. The current sampling intensity does not allow for a complete picture of country level estimates for a particular given time (for example, 2-4 years) which would be essential to assure investors if India were to engage on the global markets for carbon.

Table 3. India's Physiographic Zones (FSI)

Zones	Geographic area
1.	Western Himalayas (WH)
2.	North East (NE)
3.	Eastern Plains (EP)
4.	Central Highlands (CH)
5.	East Deccan (ED)
6.	Western Ghats (WG)
7.	West Coast (WC)
8.	Eastern Himalayas (EH)
9.	Northern Plains (NP)
10.	Western Plains (WP)
11.	North Deccan (ND)
12.	South Deccan (SD)
13.	Eastern Ghats (EG)
14.	East Coast (EC)

Currently, there are discussions underway for developing a National Inventory Management System (NIMS) and further strengthening the Indian Network of Climate Change Assessment (INCCA) under the MoEF. The REDD+ framework, when in place, will likely track closely with both the NIMS and INCCA as the GoI is building on approaching climate change in an integrated fashion. The NIMS

would address requirements of documentation, archiving and continuous updating of databases as well as the Quality Assurance/Quality Control and uncertainty management issues of GHG inventories. In the REDD+ context, engaging on improving the current NFI and baseline references that provide the backbone for a system such as the NIMS would be critical.

In discussions with Assessment participants and experts, the general consensus was that while sound policies for a national forest inventory system exist, and forest cover mapping is available every two years, the system needs to be energized to include new tools, technologies and methodologies and there is a need to ensure that inventories happen at regular intervals. One of the challenges that the participants pointed out was that forest inventory information is not adequate both at the national and sub-national levels and that there is a lack of precise baseline information.

National Inventories and Remote Sensing

India is also rapidly moving towards using remotely sensed data for carbon estimates. Collaboration with the National Remote Sensing Agency (NRSA) and FSI would need to highlight the fact that methodology for measuring forest cover exists, but forest carbon cannot be measured directly using remote sensing technology alone (Macauley et al. 2009). For the NFI and REDD+ purposes, since allometric relationships in combination with on-the-ground sampling are the appropriate methodology to estimate above and below ground carbon in forests currently, investing in refining sampling methodologies and intensifying sampling in key areas needs to be a priority together with remote sensing. Individual carbon sequestration projects sometimes use remote sensing data that have already been generated by large scale studies but the resolution of the data is not adequate at a project level.

The Indian Institute of Remote Sensing (IIRS or the NRSC) of the Indian Space Research Organisation (ISRO) in Dehra Dun through its ISRO Geosphere Biosphere Program (IGBP) is responsible for the National Carbon Project (NCP). In the REDD+ context, the NCP is an important initiative for the U.S. to engage with collaboratively as the NCP goals include responsibility for: (1) assessment of carbon pools, fluxes and net carbon balance for terrestrial biomes in India, (2) establishing an observational network, creating remote sensing-based spatial databases for modeling and periodic assessment of net carbon balance in India, and (3) providing support to the Second National Communication (SNC) activities of MoEF with regards to carbon balance. In its March 2010 Status Report, the NCP is currently being implemented as a set of three inter-related sub-projects:

- Vegetation Carbon Pool Assessment
- Soil carbon Pool Assessment and
- Soil and vegetation – Atmosphere Carbon Fluxes

Of particular interest to USAID's REDD+ assessment within the forestry sector and specifically with regards to the inventory and monitoring aspects of REDD+, the GoI's Vegetation Carbon Pool Assessment would be useful to consider collaboration on as it deals directly with an assessment of terrestrial vegetation biomass in the country using ground sampling and satellite remote sensing data. NCP's Vegetation Carbon Pool Assessment will also be used to generate geospatial data of the terrestrial carbon tied up in vegetation along with uncertainty estimates. Collaborating with the

GoI in this area might be helpful to the GoI in ensuring that standards and methodologies employed are compatible so that global exchange of data and information is possible in the future.

In the GoI case, degradation appears to be a much bigger problem than deforestation. In order to detect degradation, very fine scale remotely sensed data is needed, which is not a cost-effective option at present for the whole country. Currently the GoI has 1:50,000 maps available for sharing with other GoI institutions only. Under a Government to Government (G2G) policy, this information and data are not under the open access domain currently. Some additional challenges and gaps raised at technical meetings in Dehra Dun and with individual experts indicate that additional effort in improving MRV related issues, capacity and implementation infrastructure is necessary. However, MoEF and leadership in Dehra Dun believe that improvement will happen through international collaboration and exchange of information and ideas with other technical professionals and researchers. MoEF indicated a desire for collaboration and cooperation between the GoI and the U.S. particularly with their Forest Survey of India (FSI), Indian Council of Forestry Research and Education (ICFRE) and other technical Institutions in Dehradun and across the country at higher levels (Table 4 below). MoEF also indicated a desire for support in capacity-building at the lower levels particularly with frontline forest staff.

Table 4. Institutes identified by MoEF as key partners for collaborating on REDD+ issues in the Forestry Sector

Areas for cooperation	GoI identified Indian Institutions
Forest Inventory, monitoring and mapping	Forest Survey of India (FSI)
Estimating Carbon stocks using Remote Sensing technologies and setting up methodologies for carbon assessments	Forest Survey of India (FSI)
Adaptation, agroforestry and water research	Indian Council of Forestry Research and Education (ICFRE)
Management of forest productivity	Indian Council of Forestry Research and Education (ICFRE)
Improving genetic stocks	Indian Council of Forestry Research and Education (ICFRE)
Exchange of scientists	FSI and ICFRE
Broad Capacity building across a number of areas under REDD+	Indira Gandhi National Forest Academy
Capacity building of frontline forestry staff	State Academies
Training for non-Forest Service professionals, NGOs and others working in the forestry sector	Indian Institute of Forest Management, Bhopal
Training related to socio-economic aspects as well as to create manpower outside GoI on forest management issues	Indian Institute of Forest Management, Bhopal

Information Available for Baseline Deforestation/Degradation Estimates

India has a total land area of 329 Mha of which 21% is classified as forestland (FSI 2003). The total growing stock of trees inside forests is estimated at 4829 million cubic meters with an average growing stock of 72 cum/ha, which is much lower than the world average (Gundimeda et al. 2006). The forest cover in different states is diverse ranging from 3%-87% of their geographical area (Gundimeda et al. 2006) with the Northeastern states [Arunachal Pradesh (81%), Mizoram (87%), Nagaland (82%), Manipur (76%), Meghalaya (78%), Tripura (77%) and Sikkim (46%)], accounting for 21% of total forest cover in India. To add to this complexity, of the total area under forests, according to Gundimeda et al. 2006, 58% are classified as "Dense" with a crown density greater than 40%, 42% are typically "open forests" with a crown density ranging from 10 to 40%.

As indicated in Section 2, the GoI, for reporting purposes classifies its forests into four different categories (1) "Very Dense Forests" with a canopy cover of 70% and up, (2) "Moderately Dense Forests" with a canopy cover between 40% and 70%, (3) "Open Forests" with a canopy density between 10 and 40% and (4) "Scrub" or degraded forest lands with a canopy density less than 10%. Non-forest treed landscapes are not included in these classes (FSI 2009). Given the diverse spread of these resources, and considering classifications in the REDD+ carbon context, tracking them at the State and local levels will be critical.

Based on discussions at MoEF and at the technical institutes in Dehradun, baseline information for policy makers and the public is considered to be scanty and methodical systems need to be created to make it easily available. There is also lack of manpower and technical capability at the State and local levels to make this information easily available to stakeholders. From a status and trends analysis and modeling perspective, validation of historical data is a challenge. This is important for scenario building and tracking land use changes in the natural resources management sector and REDD+ carbon context. Discussions on setting up distributed open access web networks to make inventory data and information available both at the national and state level, resonated with the participants at the workshop as being a major gap that needed to be addressed.

Identified gaps in data and information availability in several areas

Statistics on insect induced mortality date to 1947 and 1972 for various States (Gundimeda 2006). These statistics are used to generate volume estimates which are converted to carbon estimates. There was significant concern at the Dehradun Forest Inventory and Monitoring Workshop that baseline inventory information and science as well as systematic assessment of forest degradation from insects, diseases, pathogens and mortality, is lacking. Discussions indicated that there is a need for this information both from a national and sub-national perspective to make informed management decisions for carbon enhancement. Open access data and precise information are also lacking on deforestation and degradation and there is a need for these from a research perspective as well as for decision making and for the general public.

Another gap relates to information on carbon stocks affected by forest fire. ICFRE currently estimates the volume of carbon stocks affected by forest fire. As a result of frequent fires and heavy grazing only 18.3% of the total forest area has regeneration potential for desired species (FSI 1995; Gundimeda, 2006). Gundimeda (2003) estimated that when a forest is affected by fires, only 20% of the stem biomass remains, 50% is burnt and the carbon transferred to the soils, with 30 percent

being released to the atmosphere. Information, data and more accurate inventory of loss in carbon stocks is needed for loss from fires.

MRV capabilities at the national and landscape scales

The MoEF has indicated that collaboration, particularly on capacity building issues in the science and technical areas, would be useful to help India develop their reference baselines for REDD+ activities. In the MRV context, the help they are seeking is clearly related to improving on the current National Inventory and Monitoring system in place and particularly in finessing and developing methodologies that will help improve carbon estimates for REDD+.

The objective of the Green India Mission is to double the area under afforestation and eco-restoration in the next ten years to 20 Mha. This includes 10 Mha of additional forest/non-forest land treated under the GIM and 10 Mha of additional land to be treated by the Forest Department and other Agencies through other interventions. Ravindranath et al. 2008, expect that both short and long rotation plantation forestry as well as natural regeneration would be included as management options under afforested area estimates and particularly in short rotation plantations, where periodic harvesting, replanting and coppicing would be likely management options. It is unclear at this point exactly which physiographic zones and land cover/land uses are being considered by the GoI as potential areas for afforestation in the future. Regardless of where the afforestation will take place, the GoI anticipating the need, has requested collaboration on improving genetic stocks of species for maximizing capture of carbon as well as developing inventory and monitoring baselines, modeling capabilities, and improved tools and technologies to aid in afforestation initiatives under the REDD+ landscape. There are a number of donor based initiatives, for example the state based JICA projects and World Bank projects, that are currently working in the forestry sector in various areas building infrastructure capabilities and capacities. However, India has strategically asked the U.S. to collaborate on developing the national level capacities for inventory and monitoring in general and for REDD+ in particular given US strengths and level of financial commitment in the natural resources management area.

Some additional areas that need specific focus were raised at the Inventory and Monitoring meetings in Dehra Dun. Participants at the workshop agreed that addressing these challenges under the MRV component of USAID's REDD+ strategy for India, would be critical. They include:

- **Standardization of reporting systems and harmonizing of work at the unit level.** This is currently a national and sub-national challenge and orchestration of inventories at the unit level needs to be systematized and conducted at regular intervals.

- **Building a sound MRV infrastructure at the sub-national level.** The current system is "weak and needs improvement". To address this, reorganization of manpower is needed at the sub-national level where dedicated manpower and focused attention to inventorying and monitoring activities, is necessary.

- **Streamlining the stratification and implementation processes related to inventorying and monitoring.** This is a challenge both at the national and sub-national level as there are varying degrees of capacities across the country

Addressing needs associated with improving the information and inventorying infrastructure, networking among institutes and organizations conducting national level NRM inventories, and providing proper training at all levels needs to be a priority.

Capacity-building needs at national and local levels in forest inventory and remote sensing for REDD+ purposes

Keeping this GoI landscape in mind as well as the operational parameters under the Sustainable Landscapes pillar of the U.S. – India Strategic Dialogue, areas where capacity building are needed are outlined below for potential USAID engagement with the GoI on REDD+ issues.

Capacity building on Measuring, Reporting and Verification (MRV) Issues

Capacity-building in both technical areas related to (1) inventory and monitoring and on (2) basic sciences related to ecosystem level processes that feed into improving carbon estimations and improved productivity seem key areas for collaboration. Field measurements are essential for producing data to build, calibrate and update inventories, maps, models and other necessary types of information in developing a REDD+ framework (TCG 2010). One of the most important directions for investment and activity is application of existing tools and methods to fill data gaps for underrepresented land classes and regions in the NFI. From a USAID - India NRM collaboration perspective, sharing advancements in field measurement capabilities focused on new and improved methods for cost efficient inventories will be critical to producing regionally relevant conversion factors and allometric equations for all types of carbon pools and land classes

Capacity building of the technical institutes (Table 4) involved in national monitoring and inventory would help meet some of the current needs of MoEF in preparing to fully engage on REDD+ activities. According to the UN REDD Roadmap for Terrestrial Carbon Science, and in anticipation of issues covered under the Green India Mission, national and project-scale accounting will likely have different data requirements. Typically, project accounting focuses on smaller areas and emphasizes a finer geographic scale of measurement and higher frequency of monitoring. At the national level, the geographic scale is much coarser but comprehensive for major land cover types with a lower frequency of monitoring. The roadmap rightly points out that national carbon accounting systems require appropriately scaled up technical tools and infrastructure for documenting changes in carbon over space and time, and resulting data systems will need to align with existing and evolving international guidance as well as country circumstances, and be capable of integrating project scale data. As India progresses on its REDD+ path a number of processes, policies, methodologies and capacities will need to be developed to participate effectively in the REDD+ landscape.

Capacity Building to Improve Monitoring and Inventory Systems and Capabilities

On the monitoring and inventory front, areas where capacity building is needed are prioritized into three broad categories with specific areas listed as standalone issues in order of importance. To prioritize these potential capacity building areas, criteria such as achieving the greatest impact with minimal cost, yielding quick deliverables, actions having most impact at the national level (since REDD+ reporting will eventually have to be a national level effort), GoI needs, and USAID actions having a significant impact on increasing carbon sequestration while reducing emissions, have been used. These can be standalone actions or initiatives or be bundled as elements under a broader framework dependent on funding levels and timely opportunities.

Prioritized Areas for improving the national reference baselines for REDD+ activities

1. Discussions for improving sampling designs for REDD+ through a workshop and/or relevant training would be a useful way to demonstrate that there is a need for intensified sampling before engaging fully on a REDD+ framework.

2. Collaboration on using ground level inventory data and remotely sensed data to improve estimates at the plot level as forest carbon cannot be measured directly from remote sensing but is derived from allometric relationships in combination with on-the- ground sampling. Because of the uncertainty of final forest carbon measures is an aggregate of the uncertainties of each component of the measures, it is critically important that the inputs be accurate and precise (Macauley et al. 2009, Fagan and Defries and references therein) both on ground level inventories and interpretation and use of remotely sensed data.

3. Collaboration on development of cost-effective, easy to use tools and methods and spatially resolved accurate data gathering at local levels may be needed to expand focus to all land classes, regions and carbon pools.

4. Collaboration on improving sampling methodologies to meet needs at the State and local levels because for project level implementation of terrestrial carbon management, detailed location specific information must be collected to predict, measure, and document the carbon outcomes of changes in land management.

Prioritized Actions for Building Human Capital Skills at the State and Local Levels

5. Capacity building at the State level where there is a need for trained staff dedicated to carrying out periodic forest inventories

6. Capacity building of frontline Indian Forest Service personnel (forest officers, rangers and forest guards) to raise their awareness on climate change related issues and to provide training on a host of natural resource management, carbon and REDD+ related issues

Prioritized Improvement of Inventory and Monitoring REDD+ Information and Data Networks

7. Improving the information infrastructure by making GoI project level information and carbon estimates and methodologies available on REDD+ monitoring and inventories. Collaboration on expanding and building regional and global networks which can provide needed linkages across field research and technological advancements and facilitate access to tools, databases, technical support, infrastructure and extension services for public and private sectors.

8. Collaboration on efforts to improve convergence and consistency to produce synthesized scientific knowledge, harmonized reporting guidelines and methodologies, compatible terminology, definitions, classifications and integrative modeling.

SECTION 5 - ENABLING ENVIRONMENT AND INCENTIVE STRUCTURES

Key Government and Ministry Players

The Ministry of Environment and Forests (MoEF) is the nodal Ministry for climate change related activities, such as REDD+. However, the eight missions of the National Action Plan for Climate Change are being coordinated and implemented by various Ministries, with the Green India Mission being coordinated by the MoEF and its various agencies. The Indian Council of Forestry Research and Education (ICFRE) is the umbrella organization for research and capacity building of government foresters. The Forest Research Institute and University (FRIU) at Dehradun is a 100 year-old institution for forestry research and education. The FRIU offers post graduate programs for non-government foresters as well, while the Indira Gandhi National Forest Academy (IGNFA) is the apex training institution for government foresters. The IGNFA offers induction level training for the officers selected for the India Forest Service for different states and mid-career training. For state level officers training, there are six regional institutions.

There are six other institutions, under ICFRE, located in various part of India and involved in specific research:

- Tropical Forest Research Institute , Jabalpur (M.P.)

- Institute of Forest Genetics and Tree Breeding, Coimbatore (Tamil Nadu)

- Institute of Wood Science and Technology, Bangalore (Karnataka)

- Arid Forest Research Institute, Jodhpur (Rajasthan)

- Himalayan Forest Research Institute, Shimla (Himachal Pradesh)

- Rain Forest Research Institute, Jorhat (Assam)

In addition the Indian Institute of Forest Management (IIFM) at Bhopal offers forest education and management training for the non-government forestry sector.

There are a few other GoI Ministries, which are indirectly working in tree plantation and rehabilitation of degraded forest lands. The Ministry of Rural Development has a Department of Land Resources, working on improving degraded lands while the Ministry of Agriculture's Rain Fed Area Development Authority deals with agriculture and land improvement practices. The Ministry of Water Resources works on watershed management in various areas. The Ministry of Science and Technology and the Ministry of Earth Sciences each provides scientific inputs such as climate data to the MoEF climate change initiative.

Review of current, relevant policies for REDD+

Forestry has a long and well documented history in India (Rawat and Kishwan 2008; World Bank 2000). Authors often present the three phases of Indian forestry as outlined in Table 5 below.

Table 5. Three Phases of Forest Policy in Independent India

Period	Main Focus
1947-1976	Forests for timber and industry, neglect of village commons
1976-1988	Intensification of commercial forestry; meet industrial demand from natural forests (by logging and conversion) and shift subsistence demands from natural forests to social and farm forestry on non-forest and private lands
1988 onwards	Joint Forest Management, and a radical shift from the earlier revenue orientation, conservation is a priority

Source: Forest Trends (undated)

Major policies in the forestry sector are listed below (Rawat and Kishwan 2008) with descriptions of the most significant ones.

1. The Indian Forest Act (1927);

The objective of the 1927 law is to protect forests from people and is the source of the restrictive cutting and transportation regulations which have remained mostly unchanged despite a move towards social forestry. It also gave state governments the power to convert forest land to other uses, which many did. A constitutional amendment in 1976 gave concurrent power over forests, requiring states to get conversion permission from the central government.

2. The Indian Wildlife (Protection) Act (1972), amended 1993;

3. Forest (Conservation) Act (1980) amended 1988;

4. Forest (Conservation) Rules (1981) amended 1992;

5. The National Forest Policy (1988);

This policy reversed the emphasis on commercial forestry on forest land in favor of conservation of soil and ecological services and underlined the role of forests in meeting people's subsistence needs. It outlined the rights of tribal people and the poor to access forests for subsistence needs for fuelwood, fodder, minor forest products and construction timber. JFM became the implementing mechanism for this policy, where communities were charged with forest protection in exchange for access to minor forest products and a share in the sales from timber which was still fully controlled by the forest department and state forest corporations.

6. The Wildlife (Protection) Rules (1995);

7. Biological Diversity Act (2002);

8. Forest (Conservation) Rules (2003);

9. Biological Diversity Rules (2004);

10. National Environment Policy (2006); and

11. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Rights) Act 2006 ---a.k.a. Forest Rights Act (FRA) or Tribal Act-- and rules- 2007.

The Forest Rights Act (2006) recognizes rights of Scheduled Tribes[3] and other traditional forest dwellers to occupy and use already settled areas within the forest areas. The act is meant to rectify the overlaying of the forest estate onto already occupied and farmed lands. It provides recognition of rights of occupancy and use for already settled areas within the forest estate. Land still cannot be bought or sold but it can be passed to the next generation. It also recognizes the right to livelihoods from forests (not just subsistence use) and access to minor forest products. Rights also include right to protect, conserve and manage forests. Hunting is still not allowed. Tribal populations can be found in many states in India. Their total population is estimated at approximately 24% of India's total population. Many tribal people are unaware of their rights under this new law and it remains to be seen how it will impact forests, forest access and local livelihoods. The FRA is implemented by the Ministry of Tribal Welfare with the MoEF as facilitators.

In 1976 the National Commission on Agriculture oriented forest tree planting activities to farms and common land with the objective of timber production. The purpose was to promote productive forest plantations outside of forests. However, restrictive regulation on felling and transporting of timber remained in place.

Policy and government reforms identified for REDD+ readiness

Comments from the four workshops pointed out various policy issues. Many of the issues are more related to the challenges of implementing policy rather than of a policy "gap" per se. The main themes brought up by stakeholders (NGOs, donors and the officers and scientists of the ICFRE, MoEF.

- **The disconnect sometimes existing between policies set at the national level (with targets) and the states who must implement them.** A case in point is the newly released draft of the Green India Mission with ambitious tree planting targets for each state. It is not clear if there is enough appropriate land in the states for the targets, nor are there adequate resources to meet the targets. Furthermore, large jumps in targets require building capacity to scale up (e.g. seeds, nurseries, financing, more JFMC, etc). Capacity-building is often not considered in the national level plan.

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[3]   Scheduled tribes include Dalits and Adivasis.

- **Some conflicting or non-aligned objectives within a policy or among policies.** The primary objective of the MoEF is to maintain ecological services of forests. While joint forest management committees (JFMC) are increasingly depended upon to implement the actual work, they do not share this objective, their objective is subsistence and income needs. Similarly, communities are given the mandate to protect forests but not the power to do so (they have few resources, no right to exclude others from forest use and little incentive). Lastly, national and state level policies do not always align.

- **Some conflict between development and conservation objectives and fragmented government policies.** The National Forest Policy 1988 of Government of India has a goal of 33% of India being under forest cover, while the GoI is also promoting targets of 7-9% GNP growth for each state. Development objectives usually prevail (mining, roads, and infrastructure). There are far fewer resources for conservation. See financing section for more information on the CAMPA compensation scheme to "compensate" forests for degradation caused by mining.

- **Some conflicts between panchayat and JFMC.** The panchayat has more rights/power than the JFMC. A recent directive is now saying that JFMCs must work under and be subordinate to the panchayat. The justification is that there are now many JFMC type committees within a village working on different development projects and these can only be coordinated and integrated if they are all under the village council (i.e. cannot have parallel institutions within the village).

- **Variable regulation of timber harvesting, marketing and transport is a disincentive to tree planting and raises transaction costs.** Timber felling and marketing is the exclusive right of either the State Forest Department or Forest Development Corporation4. The transit permit, conceived as a preventive mechanism to protect forests, requires the state government to give permits to the forest communities or farmers for harvest and transport of their harvested trees. The actual requirement on transit permits vary by state and districts within states –the state of Uttar Pradesh has exempted 16 tree species in 42 districts, whereas in the state of Haryana, there is no transit permit. Most states identify species exempted from this requirement which are mostly exotic species commonly used in agroforestry and farm forestry.

- **Since REDD+ is very new to India, it is not clear who owns the carbon and other environmental services (water) and if communities or JFMC would have the right to sell these environmental services.** Even for community owned and private forests, it is not clear who owns the carbon. This is a large, and potentially contentious, policy gap. Policies (national and state) in the future might treat carbon like timber and use the current state level benefit sharing mechanisms for wood to distribute carbon revenues.

- **If communities received carbon revenues, what liabilities might they take on if carbon was "lost" due to fire, pest outbreaks, etc.?** Is there a need for carbon insurance to buffer communities from loss or liabilities in the carbon market?

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[4] More information on this subject is needed, i.e. how does it apply to agroforestry and farm forestry, how exactly is the felling, selling and marketing of wood done.

Existing institutional capacity and strengths for developing and implementing REDD+ projects

The national level agencies related to forestry have highly educated and capable staff. The state level staff receives less training and resources and suffers from vacancies at the frontline level. They most likely have little familiarity about carbon, climate change or carbon markets. Village JFMC are the least likely to receive training and capacity building but are the building block for increasing forest cover. Similarly, incentives at the village level are inadequate to fully engage communities in forest protection and forest enhancement (more details in Section 6)

National Level

Indian Forest Service (IFS)

Traditionally this has been an elite corps of personnel that pass a competitive exam and then undergo over 24 months of training with regular training throughout their careers and one year in the state (cadre allotted to the candidate). However, as forestry and forest policy in India has shifted towards greater interaction with and dependence upon communities in forestry, the curriculum and educational background of recruits seems out of touch with the modern realities of a forester's challenges. No mention was made of recruiting staff from the social sciences (sociology, economics, business schools) and there is only one course in the curriculum on community forestry. Missing areas of study and training include business administration, organizational training, adult education, land tenure studies, economics, value chain analysis, anthropology and sociology.

Forest Survey of India (FSI)

The Forest Survey of India (FSI) is an organization under GoI's Ministry of Environment & Forests. Its principal mandate is to conduct survey and assessment of forest resources in the country. It is the institution responsible for conducting the forest inventory of the country. It is India's counterpart institution to the USFS' Forest Inventory and Analysis (FIA) program which conducts the U.S. national inventory.

Indian Council of Forestry Research and Education (ICFRE)

ICFRE is conducting good research on rehabilitating degraded lands and on NTFP domestication. Missing is a means to disseminate techniques and results to the field through the state forestry system. Funds for demonstration plots in states and wider collaboration with state managers/researchers would be effective. The MoEF has specifically requested USAID support for: scientific exchanges, access to improved genetic stock, new models for enhancing carbon stock, (including agroforestry systems) and research on forest adaptation to climate change.

Indira Gandhi National Forest Academy (IGNFA).

This highly competitive Academy trains and graduates Forest Officers in a two year program, plus provides continuing education courses to other forestry officials. The MoEF asked for USAID support for capacity building at all levels.

IIFM (Indian Institute of Forest Management).

The MoEF asked for USAID support for capacity building here as well. IIFM trains non-government foresters in forest management and has a greater focus on socio-economic subjects. It was widely recognized during our USAID assessment that socio-economic aspects of forestry and forest

management was lacking in the GoI and USAID support or partnership with institutions such as IIFM could greatly facilitate GoI's engagement in this arena.

State Level

In the past most donors engaged in natural resources management programs and projects in India have provided direct support to the states for implementing forest projects. As mentioned earlier in this report there is an acute shortage of adequate staffing at the state level with only 50% of forest guard positions filled in most states. Two broader GoI programs are contributing to this gap. The first is a mandate to hire high school graduates at the local level. The state FD will use these high school graduates instead of Bachelor level graduates for their front line positions (foresters and forest guard). When a state level junior position is available, they must give preference to these high school graduates if they have worked for more than 3 years for the FD.

These junior staff lack adequate education and training to fully perform in this role and greater capacity building is needed throughout the state FD system and most especially, training in social forestry. Each state has its own forestry training school (or a regional level school covering a few states) where staff are recruited and trained within the state and do not attend elite training in Dehradun.

State level foresters develop micro plans to feed into district/divisional plans which determine activities (mostly plantations and tree planting) and budgets. They are also engaged with their substantial policing role to make sure rules and regulations around forests are followed. Their training is geared almost exclusively for protecting forests and raising plantations. In all our interactions during the assessment workshops the importance of capacity building of front line forestry staff in community oriented forest management was strongly emphasized. It is not clear what their role is vis-a-vis the JFMC. Do they help to organize such committees? Are they involved in building village level capacity for forest and NTFP management? .

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), a flagship program of the GoI, guarantees 100 days of employment over a year. These funds are used extensively by the state FD to finance forestry activities through the JFMCs. Other major uses of this fund is for soil and water conservation activities, road construction, drought proofing, watershed development, improvement of degraded land, and other priority areas under rural development programs that may have a high priority in particular states.

Village and Community Level

If capacity building is sparse and lacking at the state level, it is even direr at the village and JFMC level. Resources do flow through the JFMC (and now the panchayats) for forestry activities. See next Section 6 Community Forestry for additional information on community level perspectives.

SECTION 6 - COMMUNITY FORESTRY

Joint Forest Management

Joint Forest Management (JFM) began in India in the 1980s as a way to rehabilitate degraded forests in the face of resource and staff constraints at the national and state level. Under this system communities are given management responsibility over mostly degraded, state-owned lands in exchange for a share of timber sales and access to fodder, fuel, and non-timber forest products (NTFPs). By February 2007 there were an estimated 100,000 Joint Forest Management Committees (JFMCs) that manage over 20 million hectares out of the 76 million hectares of forested lands in India (FAO 2009). There is wide variation in how organized and active the JFMCs are, and in reality many only exist on paper or are only mobilized for plantation projects.

All JFMCs have a Memorandum of Understanding (MOU) with the State Forest Department (FD). The committees include a household member from each family in the village that is managing the village forest (VF) as well as a forester from FD that serves as member secretary. In rare cases JFMCs have demanded more independence and succeeded in eliminating FD presence on their committees and filling the member secretary role with one of the villagers. Until recently JFMCs have remained independent from the panchayat- the village governing structure. However, some recent government guidelines suggest that JFMCs begin operating as sub-committees of the panchayat.

In addition to managing and extracting non-timber resources from the VF, villagers also share revenues from the state-owned reserved forests (RF) and protected forests (PF). While the government fully controls all timber harvest, processing, and sales, the JFMCs receive a portion of the proceeds from timber harvests on VF, RF, and PF lands. The percentage varies by State from 20 to 100 percent (World Bank 2006). Villagers also have access to NTFPs from all state-owned forested lands, except in cases of rare or endangered species. They are allowed to collect NTFPs for personal and subsistence use, but any marketing or selling is regulated by FD, the panchayat, or through state marketing enterprises. However, there are some examples of community cooperatives that collect, process, and sell NTFPs with limited or no government intervention (MoEF, personal communication).

JFMCs have accounts that can receive government funds. From the state government they receive revenue shares from timber sales, the percentage of which is determined by state law. There are also funds that come from the national level, including from the National Afforestation and Eco-Development Board (NAEB), part of MoEF, which channels funds to JFMCs for specific afforestation projects. JFMC accounts fund general community development projects in the village and pay daily wages for workers. At the community level the funds are not used specifically for forestry, but assist in building infrastructure, and improving education and health services. According to the Indian Forest Service (IFS) most villagers consider the JFMCs successful when they see broader community development benefits to their communities.

Multiple NGOs raised the issue of lack of equity in JFMCs, with women and disadvantaged groups (such as lower castes) being underrepresented. In addition to equality issues in participation,

allocation of benefits varies greatly by caste, gender, class, and occupation (Agrawal and Ostrom 2000). NGOs also noted, anecdotally, that many of the most successful JFMCs, in terms of active participation and commitment to project implementation, have strong women's leadership. This is largely due to the fact that in rural areas men are often working outside of the village, while women are less mobile and are the ones using the forest most frequently. It makes sense that having strong participation of the highest user groups on the JFMCs would result in more active committees that are seeking more participation and control over the forest resources.

Increasing communities' control over forest resources has improved forest condition (Chakraborty 2001, Webb and Gautam 2001) and livelihoods (Agrawal and Ostrom 2000, Dongol et al. 2002) in neighboring Nepal. While there are definite success stories in the JFM system of increased tree cover, improved community livelihoods, and community development, a lot can be done to improve community participation in resource management.

While land ownership is not essential for successful decentralization (Agrawal and Ostrom 2000), other changes in the JFM model that would move towards decentralization include:

- Experiment with leasing or concessions to communities to give them more resource control
- (this has already happened)Increase community's control over timber resources
- Loosen marketing and permitting restrictions on forest products so that communities have the right to exclude over-users, incentive to sustainably manage NTFPs, and improved livelihood benefits from processing and selling NTFPs
- Remove FD right to dissolve committees
- Increase community capacity in forest management
- Build awareness in FD on success stories of community forest management
- Increase number of social scientists in FD and training to foresters in community involvement
- Implement monitoring program for JFM so more information is available on forest condition and livelihood improvements based on various interventions

Community Forest Management

While JFM co-manages State owned land, there are also communities that are managing private or community owned forests. Called Community Forest Management (CFM), or Community Conservation Areas (CCA), these lands exist mainly in tribal areas of northeastern India, with isolated pockets in other states. These groups own the forests, but their ownership is not completely secure since the government maintains the right to purchase any non-government land. Unlike JFMCs, these groups have no mechanism for receiving funds or training from the government and they operate independently. NGOs like World Wildlife Fund work with these groups in Arunachal Pradesh to improve capacity and livelihoods from forest products.

The Forest Department recognizes that CFMs have more control over the forest resources than JFMs. In cases where JFMCs have strong capacity, appropriate technology, and a track record of good management, the government is willing to 'graduate' JFM to CFM (MoEF, personal communication).

Forest Rights Act (FRA)

One mechanism for transferring land ownership to individuals and communities is through the Tribal Rights Act of 2006 (also called the Forest Rights Act, or FRA). This act is intended to give families and communities title to the forest and cultivated land that they have historically been using. It is not a land re-distribution act, but rather an attempt to give people ownership of land they already use. Implementation has been slow or absent, depending on the state, but once fully implemented it is expected to affect approximately one-third of the total forest land of the country (MoEF, personal communication), mostly in tribal areas. While there are provisions in the law for the transfer of ownership to communities for the establishment of Community Forest Resources (CFR), most claims up to date are individual claims. National and local NGOs engaged in community forestry are working on awareness-building in communities on the CFR provision of the law in order to mitigate individual claims.

Major questions on the effects of implementation on community forestry remain. For one, the law is silent on how the privatized land will be managed, how it might intersect with government control, and who will own/control the timber and other resources (including carbon). Second, if individual claims continue to greatly exceed community claims this could negatively affect existing JFM and CFM in some areas by converting community resources into individual property.   Alternatively, FRA provides huge opportunity to give ownership and more resource control to communities over time.

Linking REDD+ to Community Forestry in India

Successful REDD+ implementation in a country will be partially based how well it integrates forest conservation with community rights and livelihood development.   Among organizations and individuals advocating for people's rights to natural resources, a major hope for REDD+ is as a poverty alleviation mechanism that will give communities financial incentive to protect their forests without denying them access to essential and traditional forest products. The JFM structure in India, with some reforms, can be used to implement REDD+ projects, help India meet its ambitious Green India Mission goals, and improve community livelihoods.

Benefit sharing

In the JFM system there is already well-established benefit sharing mechanisms and distribution of funds from national and state levels to JFMCs. However, these mechanisms are often overly complex and have high transaction costs (World Bank 2006). REDD+ projects in JFM lands could utilize the JFMC accounts for sharing benefits with communities. New policies would need to prescribe percentage of benefits from carbon credits going to JFMCs from REDD+ projects. Policies that provide safeguards for forest users, especially women and minority groups, would also need to be put in place to ensure forest-based livelihoods are not excluded in REDD+ programs.

CFMs, on the other hand, do not have benefit-sharing or fund sharing mechanisms with the government. Similarly, implementation of FRA will result in more privately owned forest lands that will not have access to benefit-sharing mechanisms with the government.

Community participation

In the current system JFMCs are mobilized and trained (in some cases) for nursery and plantation projects. In potential REDD+ projects, JFMCs could receive training for implementing afforestation

and rehabilitation projects. Community members are not currently involved in the national forest inventory data collection or forest monitoring (FSI, personal communication). With training they could also get more involved in the forest inventories and monitoring that will be required for REDD+ projects.

While women and disadvantaged groups are often underrepresented in JFMCs and panchayats, new policies that will be created for REDD+ offer the opportunity to mandate underrepresented groups' leadership and participation in REDD+ projects. Since these groups are also the most frequent daily users of forest products, making sure women and disadvantaged groups have a central role in establishing, implementing, and monitoring REDD+ projects would provide livelihood protection.

SECTION 7 – REDD+ FINANCE, INVESTMENT AND BENEFITS SHARING

Overview

Despite the large forest estate managed by the MoEF and the many environmental services and direct products that forests provide to a large percentage of the Indian population, the sector appears to be under resourced. A common complaint we heard from MoEF is that they do not receive enough budget and resources (often a third of what they request). There does seem to be a perceived conflict between MoEF's activities in support of forest conservation and development objectives of other ministries that add to GNP targets. Better environmental accounting, reflecting the full value of the forest resources, could help the MoEF win more budget battles if forest contributions to GNP were better documented and understood. Gundimeda et al (2007) speculated that NTFP incomes were undervalued tenfold—fodder and fuelwood offtakes are not quantified and environmental services (water and carbon) could also be estimated from forests to give a more accurate and higher evaluation to forests.

However, the MoEF has been astute in leveraging public funds from various programs (discussed below) in order to resource various forest management, protection and afforestation activities. Furthermore, they have established financial distribution systems that flow from the central government to states to the JFMC (See Annex 4 for a diagram of the GoI framework for REDD+). The distribution systems use both public funds and revenues from timber and major NTFP sales and vary by state. The existence of this distribution system offers opportunities for benefit sharing from carbon sales. A more immediate use of these distribution systems could be the piloting of payment for ecosystem services (PES) from watershed management. A limitation of the system is that it flows only to JFMC on forest estate lands and not private forests found under CFM management. It is not clear how land transfers under FRA will be affected in terms of previous access to public funds for forestry activities or for PES. Although interested in the potential of leveraging private sector resources for afforestation, there has been little experience with this by the MoEF

Financing Opportunities for REDD+ Project Development

Public funds

The GoI has enormous resources as well as needs. There are many government programs with funding, that could potentially be harnessed to promote better resource management and increased carbon stocks. A few are highlighted below.

Green India Mission

MoEF made their Green India Mission Strategy document public on May 24, 2010 detailing the draft strategy for implementing forest sector activities as one of the eight Missions under the National Action Plan for Climate Change that originated in 2008. The Green India strategy paper has a proposed budget of 44 thousand crore (~US$ 10 billion). While this is a significant amount there is no indication where the additional funds will come from.

National Afforestation and Eco-Development Board (NAEB)

Established in 1992, the NAEB is responsible for promoting afforestation, tree planting, ecological restoration and eco-development activities in the country, with special attention to the degraded

forest areas and lands adjoining the forest areas, national parks, sanctuaries and other protected areas. Grants are provided to states and NGOs for activities and projects. NAEB also supports Forest Development Agencies (FDA), which are forest division level federations of village JFMCs. This structure provides a convenient means to provide extension and information sharing. This is managed under the MoEF.

Mahatma Gandhi National Rural Employment Guarantee Act

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is managed by the Ministry of Rural Development as an Indian job guarantee program enacted by legislation in 2005. The program provides a legal guarantee for one hundred days of employment per year to adult members of any rural household willing to do public works-related unskilled manual labor at the statutory minimum wage of Rs.100 per day. Around one-third of the stipulated work force is women. The Central government outlay for this program is Rs. 39,100 crores (or US$8 billion) in FY 2009-10.

The MGNREGA achieves twin objectives of rural development and employment. There is a high potential for synergies with REDD+ activities since the MGNREGA stipulates that works must be targeted towards a set of specific rural development activities such as: water conservation and harvesting, afforestation, rural connectivity, flood control and protection such as construction and repair of embankments, etc. Digging of new tanks/ponds, percolation tanks and construction of small check dams are also given importance. The employed are given work such as land leveling and tree planting. The MoEF already uses this program heavily to achieve current afforestation targets. The Ministry of Rural Development also uses the program for their watershed management and restoration of degraded lands activities.

As background, the MGNREGA builds on the historical activities starting with the National Rural Employment Programme (NREP) which was launched in October, 1980 and became a regular Plan program from April, 1981.

Further review of synergies with MGNREGA is required since an estimated 60% of the budget is intended for natural resources sector projects. The funds were reported to be applicable for tree planting on government/public lands but not on private lands (reducing agroforestry opportunities). Other observations and discussions indicate that due to the seasonality/timing of the planting season the flexibility required may not work under the MGNREGA which sets up specific projects when there is a threshold of qualifying workers. USAID should be mindful of any environmental impacts associated with MGNREGA projects, since many projects, particularly road building, were reported to result in deforestation. Tangentially related to REDD +, it is suggested that MGNREGA should take into consideration any tree loss that results from these projects.

Compensatory Afforestation Fund Management and Planning Authority (CAMPA)

The CAMPA fund was established as a means to compensate the forestry land for mining or other development activities that cause deforestation. The purpose of the fund is for afforestation but not necessarily in the same area as the development activity. In other words, it is a type of forestry offset fund.

There is a high potential for the CAMPA funds to complement or contribute to REDD+ funding since the CAMPA funds are intended for undertaking compensatory afforestation, assisted natural regeneration, conservation and protection of forests, infrastructure development, wildlife

conservation and protection and other related activities. The Guidelines on State Compensatory Afforestation Fund Management and Planning Authority (State CAMPA) indicate that CAMPA would provide an integrated framework for utilizing multiple sources of funding and activities relating to protection and management of forests and wildlife. Its prime task would be regenerating natural forests and building up the institution engaged in this work in the State Forest Department including training of the forest officials of various levels with an emphasis on training of the staff at *cutting edge level (forest range level)* [emphasis added]. The amount received by it will also be utilized for providing residential accommodation to the field staff and necessary machines and equipments to them. In short, the department would be modernized to protect and regenerate the forests and wildlife habitat. Since the purpose of the CAMPA funds is to capitalize the State Forestry Departments to implement activities related to the possible components under REDD+, it presents a possibility of complementary funding that requires further analysis.

However concerns were raised in the workshops that these funds were designated for the discrete purpose of compensating environmental impacts and additional funding should be used for REDD+ activities. These funds are allocated to the State Forest Departments and are spent at their discretion without necessarily strategic or focused project goals. It does not appear that CAMPA funds are shared directly with the affected communities even though they are affected by mining activities and the funds may be programmed and used far away from the actual area damaged. The compensation paid is based on a Net Present Value calculation formula developed to calculate total forest values that were lost due to land conversion. This requires further review as it may still undervalue the total ecosystem services as well as the economic value of the informal forest economy.

CAMPA has accumulated significant funds in its coffers and has not yet released any. Recently the Indian Supreme Court has ordered that Rs 11,000 crore, collected for diversion of forestland for non-forest uses, be released to state governments. State Forest Departments will determine project design for use of funds.

National Watershed Scheme (under Ministry of Rural Development)
This program works through village level committees to promote watershed management activities to increase ground water infiltration and water catchments. Analysis (Chandrudu, undated) identifies similar problems to the JFMC groups with top down targets, limited technological packages, and limited participation by the entire community, especially the poor and women. However, increasing water resources can be a powerful incentive and offers an integrated approach to better forest management.

National Wasteland Development Board
The National Wasteland Development Board which was part of MoEF, became in 1992, the Dept for Wasteland Development and charged with afforestation of non-forest wastelands for fuel and fodder. In 1992, some MoEF funds and staff moved to the new Department under the Ministry of Rural Development. Current activities seem to be centered on the Watershed Management program described above, and the Integrated Wasteland Development Programme (IWDP).

Private Investment Potential
The Forest (Conservation) Act currently prohibits private sector plantations on government lands, yet there is recognition of insufficient public funds for plantation activities. The MoEF is particularly interested in the potential of agroforestry though most of those activities are on private lands so the

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link to official funding sources is more tenuous. There is an opportunity that the JFMCs or private farmer groups could be supported by the private sector corporate houses.

While the large Indian National companies such as Tata and Reliance have potential corporate responsibility investment and operationalization capabilities, there exists a large potential market in middle-sized companies that are currently dependent on unsustainable wood and fiber supply chains. This demand could potentially be aggregated to catalyze the purchase of sustainably harvested community forest products. It may also require an aggregation of the small-scale suppliers as well (World Bank 2006). Both DfID and MoEF expressed interest in the potential of catalyzing the private sector within the context of possible certification schemes such as the Forest Stewardship Council (FSC).

Voluntary Carbon Markets -- CDM A/R
There are two World Bank supported projects that are being financed by private sector companies–Tata and JK Paper Ltd. JK Paper Ltd provides both financial support and technical support (seedlings) to farmers that agree to plant trees on their land. Farmers agree not to cut the trees until after the rotation defined in the project (4 and 7 year cycle). In collaboration with an NGO that brokered the relationship with the communities, the community members and NGO were to receive a portion of the carbon revenues as a CDM A/R project. Due to lag time in reserving carbon revenues (due to CDM registration backlogs) the carbon revenues have been late in coming and farmers are starting to fell trees.

A significant challenge to implementing CDM A/R projects has been the high transaction costs of project management and MRV. Possibilities to reduce transaction costs could include pooling or aggregating of small landholdings to overcome entry barriers.

REDD+ Premium Market (Co-Benefits)
In discussions with various individuals there was some interest in developing a "premium" REDD product unique to India based on the tiger reserves. The CCB (Climate, Community and Biodiversity) standards has helped to develop a "premium" carbon credit for markets where private capital that is interested in both carbon and the biodiversity value of forests can pay a premium price due to the co-benefit of biological conservation contained in forests. There are challenges with this approach in showing additionality within reserves already set aside and managed as well as tradeoffs of tree species selection to optimize food/habitat value versus carbon content. In discussions with the Wildlife Institute of India, this co-benefits approach to management of forests for multiple benefits was of interest.

Funds Distribution Mechanisms, including Benefits Sharing

Gram Panchayat and Joint Forest Management Committees (JFMCs)
The Indian government has decentralized several administrative functions to the village level, empowering elected gram panchayats. The panchayat structure could potentially be used for distribution of carbon revenues down to the village level. Additional review is needed of the equity considerations, provisions for representation of women and distribution of benefits to the household or individual level in relation to effort level. In addition to distribution of actual carbon revenues, investment in social services or other community-level benefits may be an option. Any scheme to

distribute funds to the community level, in particular for traditional democratic institutions, should consider carefully the issues of leakage, and financial management capabilities.

Institutional framework for decentralized benefits sharing

A financial distribution system already exists whereby MoEF can distribute funds to the state and village levels (See diagram in Annex 4). The challenge is that there is a parallel relationship between the Panchayat and JFMCs. This issue is under discussion and one solution might be that JFMCs be incorporated as a working committee within the Panchayat system. While the JFMCs have a mixed record of success regarding decentralized forest management and benefit sharing, there are a few examples of success where the power and funds have been devolved to the people. Shifting fund distribution to Panchayats will likely involve a new set of issues.

Carbon revenues could also be distributed using a similar provision used for timber sales revenues. All states have a benefit sharing mechanism in place related to wood and NTFP sales. The percent shared with communities varies state by state. Previous studies on this may exist or could be part of USAID project to analyze all the various current benefit sharing mechanisms at the state level including how revenues are distributed to communities or to individuals at the village level. There appears to be no policies in place yet regarding revenue from carbon though some states are starting to draft such strategies.

Council for Advancement of People's Action and Rural Technology (CAPART) CAPART Council

The Council for Advancement of People's Action and Rural Technology (CAPART) was formed in 1986, as a nodal agency for catalyzing and coordinating the emerging partnership between voluntary organizations and the Government for sustainable development of rural areas. The voluntary sector in India has played a major role in rural development, through mobilizing communities and catalyzing people's initiatives for change, as well as through direct implementation of interventions around specific issues. CAPART is an autonomous body registered under the Societies Registration Act 1860, and is functioning under the aegis of the Ministry of Rural Development, Government of India. Today, this agency is a major promoter of rural development in India, assisting over 12,000 voluntary organizations across the country in implementing a wide range of development initiatives. As a de facto aggregator of NGOs working in rural India, there may be potential to raise the natural resource management capabilities of participating NGOs so as to bring awareness to communities about REDD+ as well as manage implementation projects as applicable.

SECTION 8 - SUMMARY OF REDD+ NEEDS AND OPPORTUNITIES IN INDIA AND OPTIONS FOR USAID/INDIA

Overarching Components

For the purposes of this Assessment Report, the overarching REDD+ needs and opportunities in India have been categorized broadly into three main themes: National REDD+ Dialogue and Actions; Development of Reference Baselines; and Enhancing Multiple Forest Values. In addition, the Green India Mission Strategy is identified as an additional opportunity for USAID engagement with the MoEF in the advancement of a Sustainable Landscapes program in India.

National REDD+ Dialogue and Actions

Donors with a history of forestry programs in India emphasized the need to invest significant resources at the national level. Most forests are state-owned and all forestry projects must include state government cooperation. However, forestry policies and projects are still centrally driven, and without significant engagement at the national level it is difficult to scale up the impact of state level programs to apply lessons and success to other regions.

The about-to-be formed REDD+ Cell in MoEF is an opportunity for USAID/India to collaborate and influence REDD+ policies and mechanisms at the national level. The role of this cell is to create awareness and capacity building on the REDD+ process for all stakeholders and to build the REDD+ strategies and policies. It will also establish guidelines on MRV and benefit sharing mechanisms (MoEF, GIM 2010). Policies, directives and targets will flow down to state and local levels. Through close collaboration with the REDD+ Cell, pilot efforts at the local level will be sanctioned and recognized at the national level with a greater chance of dissemination and mainstreaming. Additionally, there are several ministries with which to cooperate on forestry programs. While MoEF is the major GoI player on the GIM and climate change, other ministries also play a role, including:

- Ministry of Rural Development
  - Main implementers of NREGA, which can fund forestry programs
  - Promoting the move of JFMCs under the panchayat system, which could have significant impacts on community forestry
- Ministry of Tribal Affairs
  - Main implementers of the FRA (aka Tribal Rights Act) which will have significant impact on land tenure and community forestry
- Ministry of Development of Northeastern Region (DONER)[5]

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[5] This Ministry might be a good partner for any project in the NE. GTZ is working with them on CC adaptation work in the NE.

In a heavily populated country such as India, forestry is inherently social. India has decades of experience with social and community forestry and there are many stakeholders involved. REDD+ and the specter of a future carbon market provokes many emotions—fear, opportunism, confusion—all of which would benefit from objective information flows, debate, education, outreach and a broad participation from civil society, the private sector and various sectors and levels of government.

Development of Reference Baselines

Viability for REDD+ credits will ultimately depend on the credibility of the MRV systems. India has an advantage over many countries with its long standing forest inventory and survey data. However, REDD+ poses many new challenges which will require new technologies, methods and innovative means to increase accuracy while holding down costs. Carbon models are still needed for certain forest types and interventions for increasing forest stocks. There are challenges in balancing satellite data with ground truthing and how best to include local populations in the monitoring efforts.

The GoI recognizes the need to establish credible national baselines and methodologies associated with the GIM and REDD+ activities in India (See Section 4 Forest Inventory and Monitoring).

Enhancing Multiple Forest Values

From a climate perspective, the goal of REDD+ is to increase CO2 sequestration through increases in carbon stocks. However, the history of forestry shows that people have varied and many incentives. "Farming" carbon or payments for carbon alone will not be sufficient motivation for communities or individuals to forego harvesting, protect trees or plant more. There is still uncertainty as to the form that global carbon markets will take when these issues have been negotiated and a global mechanism is put in place. Therefore, programs that promote additional forest values (water, fodder, fuel, medicine, timber, wildlife) in addition to carbon will have a greater chance of succeeding. Income generation will be an important incentive to increase carbon stocks in India as well as access to basic necessities. Forests do not need to be locked up in order to develop REDD+ credits. Additional carbon stocks need to be developed, but many products can also be harvested at the same time from the forest or plantation. A challenge to increasing income generating opportunities is the small scale of individual farms or community forests and the need to ensure that harvesting does not exceed carrying capacity. Some income boosting activities to consider are:

- Adding value to products (from sorting and packaging to processing)
- Organizing producers to aggregate supply (and thus bargaining power)
- Domesticating wild NTFPs for on-farm production (increases volume, improves quality and lowers costs of production)
- Strengthening or clarifying usufruct rights so forest products can be managed (and excluded from non-managers), thus more investment will occur.
- Consider other environmental services which might have a market or serve local needs (such as water or a wildlife sanctuary)

Empirical evidence supports that community involvement in natural resources management improves both forest condition and livelihoods. There are, however, many different opinions on how much participation is needed and how best to motivate it. India has decades of experience with community participation in forest management and afforestation projects. Similarly, there are examples of community forestry around the world and extensive research on how to increase participation, benefits and forest protection. To achieve its ambitious "Green India Mission" goals, India will be dependent on community participation and will need to innovate further to discover the

spark that will motivate deeper community engagement. The "spark" will likely take different forms in different situations. With over 100,000 JFMCs in India, there is a solid base of experience from which to build.

National Mission for a Green India

The National Mission for a Green India is one of eight missions under the National Action Plan on Climate Change (NAPCC). It recognizes that climate change will affect and alter the distribution, type and quality of the natural resources of the country and the associated livelihoods of the people. The Green India Mission (GIM), released May 24, 2010 and currently under public review, essentially reflects GoI's REDD+ thinking and strategy and aims to address REDD+ related issues in three broad areas:

- Enhancement of carbon sinks in sustainably managed forests and other ecosystems
- Adaptation of vulnerable species/ecosystems to changing climate
- Adaptation of forest dependent local communities to challenges resulting from climate change

The GIM strategy is focused entirely on the PLUS (enhancing carbon stocks). It aims for an additional (over current government programs) 10 million ha with increased forest cover over the next 10 years. Table 6 below presents the various GIM components along with the government's estimates of costs, CO2 sequestered and cost/CO2 ton. We have added a column "USAID Relevance" showing whether Sustainable Landscapes funds can be used to support a particular component as some components are not related to forests. Components eligible for SL funding (plus agroforestry) are discussed below.

Table 6. Green India Mission Components and Relevance to USAID Sustainable Landscapes

Green India Mission (GIM) Component	Area (million ha)	Total tC/ha/yr sequestered	Rupees/ tC/yr	Relevance to USAID Sustainable Landscapes
1. Increased forest carbon in moderately dense forests (40-70% density class)	2.0	0.4	3,750	Fits Sustainable Landscapes (SL) definition
2. Increase forest carbon in degraded forests (10-40% density class)	4.0	1.5	2,000	Fits SL definition
3. Increase carbon in scrub and grasslands	2.0	0.7	3,571	Might fit SL definition, depending on final forest cover
4. Increased carbon in	0.10	2.56	1,953	Fits SL definition; could be combined with adaptation

Green India Mission (GIM) Component	Area (million ha)	Total tC/ha/yr sequestered	Rupees/ tC/yr	Relevance to USAID Sustainable Landscapes
mangroves				*funding*
5. Increased carbon in wetlands	*0.10*	*0.4*	*15,000*	*Does not fit SL definition*
6 .Increased tree cover in peri-urban and urban areas	*0.20*	*0.3*	*3,333*	*Does not fit SL definition*
7. Increased carbon in agroforestry (and farm forestry) systems	*1.50 (0.8 improved + 0.7 new)*	*3.4 (0.3 improved + 3.1 new)*	*Needs better data*	*Likely does not fit SL definition and GoI counts this category as trees outside forests (TOF). Support possibly from adaptation or food security funding.*
8. Increased forest cover in corridors	*0.10*	*--*	*--*	*Might qualify but does not involve communities except as laborers.*

Source: (MoEF, GIM 2010). Total estimated cost per GIM projections stands at 44,000 CR over 10 years. 1 Crore (CR) = 10 million Rupees=100 Lakhs; and 1 Lakh =100,000 Rupees.

General Observations on Overall GIM Strategy

The GIM strategy recognizes the overall low productivity rate of Indian forests compared to world standards (MoEF, 2010). Stocking levels of forests are half of their potential (FAO 2005). The immense pressure on India's forests for subsistence (fuelwood, fodder) and livelihood use (bamboo, medicinal plants, etc) has created a large gap between supply and demand and led to forest degradation (MoEF 2010). In particular, the rapid growth of India's livestock population (MoEF 2007) has led to severe grazing in forests and the absence of natural regeneration (Rawat and Kishwan 2008, GIM 2010). Policies and legislation giving communities more access to forest resources, such as fodder and NTFPs, has done so without, in most cases, management plans and mechanisms to ensure sustainable harvest. As markets grow for these products, unsustainable extraction increases with the resulting degradation of the resource. There are pockets of JFMCs who are managing resources well but these examples have not been mainstreamed. The strategy of continuing to establish plantations (even with improved genetic material) or enrichment planting in forests will not succeed if the root causes of forest degradation are not addressed.

Technical Observations on USAID- Relevant Components of Green India Mission

Increased forest carbon in moderately dense forests (40-70% density class)

Moderately dense forests cover 31.0 million ha in India or 46% of the forested area (MoEF 2009). Traditionally, the FD directly manages and controls productive forests. Once forests become degraded (10-40% forest cover), they are turned over to the JFMC for "protection" and management (under FD supervision and work plans). However, communities do get access to moderately dense forests for subsistence needs and NTFP collection. Thus there are extraction and livestock pressures on these forests which lead to degradation, and further incentive to degrade them so they will shift to JFMC management. Some of these forests are already under JFMC "management" and/or considered community or private forests.

Enrichment planting in already established forests is costly and often not very effective. Most forests are able to regenerate naturally without enrichment planting at much lower costs and with a greater diversity of species. The lack of regeneration in India's forests is mostly due to excessive human and livestock pressure (FAO 2005). The impacts and management of these land use practices need to be addressed. Not addressing those pressures will also negate any enrichment planting efforts as livestock eat and trample young seedlings. Fencing is not an effective option unless communities are fully participating and are offered alternative fodder and means to maintain livestock. Research/experiments involving some well-managed JFMC could explore the potential for stall feeding of livestock and protection of sections of a medium density forest to measure natural regeneration (against a control plot). Increases in carbon stocks should include benefits to the participating community (i.e. rewards based on results) and alternative fodder options must be part of the package.

Increase forest carbon in degraded forests (10-40% density class)

Degraded forests cover 28.8 million ha in India or 42% of the forested area (MoEF 2009). These areas would likely take a very long time to regenerate naturally so interventions here are more justified. The "technology packages" used for FD planning and JFMC activities are few in number and are not refined for specific sites nor reflect community priorities[6] (World Bank 2006). Experimenting with a wider range of options and greater community input could increase the success rate of these activities.

If the primary objective of regeneration of degraded lands for the MoEF is to increase carbon stocks and improve productivity (i.e. not production of timber per se), then this could be meshed with community needs for income by focusing on restoring fodder sources (grasses and trees for fodder use), marketable NTFPs such as bamboo, medicinal plants, etc as part of the regeneration package. Likely more grasses and shrubs are needed to slow water run-off, lower soil temperatures, build soil organic matter, and increase water infiltration. National level research on trees that use less water and store more carbon could be field tested in some regeneration sites. If water capture systems could also be part of the package, communities will find more immediate benefits for reducing

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[6] More information is needed on the contents of the technical packages currently used.

pressure on the forest. Technology packages would need to include community control and management of livestock grazing and management of fodder and NTFP resources.

Increased carbon in scrub/grasslands

Scrub and grasslands cover 4.1 million ha in India (MoEF 2009). If the MoEF plans to afforest these areas with a minimum of 10% tree cover, then activities could fit SL definitions. Issues for afforestation of these lands are similar to the open forest issues (i.e. attention needs to be paid to fodder and other current uses of the land to maintain benefits to communities and address root causes of degradation) but these lands might also be targets for biofuel plantings. Any large scale planting (of tree plantations or biofuels) on these lands needs to consider the current use and users and ensure if these users are excluded, that they are not simply shifting grazing and plant collection to other areas.

Increased carbon in mangroves

Mangrove forests cover 0.4 million ha in India or less than 1% of the forested area. Although the total mangrove area is small and the target for reforestation is also small (100,000 ha), mangroves are an immensely important forest resource. They store significantly more carbon than other tropical forests types, mainly due to their deep, peaty soils. They serve important functions in protecting coastlines and interior areas from cyclones and storm surges. They are also valuable as nurseries for many species of fish and critical for many fisheries. For these reasons, restoration and management of mangroves could also fit under adaptation funding.

There are two main technical considerations for mangroves and REDD+. First, forest inventory in mangrove systems is especially complex due to plot access and soil carbon sampling. It is unknown what the current inventory system is for Indian mangroves. There is not an inventory of the Indian Sundarbans (FSI, personal communication) but more information is needed on the inventory and management status of other mangrove areas. Second, success of mangrove restoration is highly dependent on correct species selection based on depth and salinity of tidal waters at the planting location. Many mangrove reforestation projects plant only the most common species of mangrove without consideration of planting location, which can result in high mortality. In addition, long distance dispersal of mangroves is common since propagules can survive floating in water for up to one year before taking root. This means that in areas where natural tidal flow is restored by removing dikes and other obstructions, mangrove can regenerate themselves without physically planting trees or propagules. Technical cooperation on mangrove rehabilitation could include both capacity-building in mangrove forest inventory for baseline and monitoring purposes (targeted to needs based on more information of the current inventory system), in addition to 'least effort' rehabilitation programs that remove constraints on natural regeneration (dikes, fish ponds, etc.) and encourage site-specific species plantings.

Increased carbon in agroforestry (and farm forestry) systems

The MoEF and many other foresters seemed especially keen on this component as offering the greatest potential for adding carbon stocks and increasing domestic wood supplies. Currently 50% of India's timber comes from farms, 20% from forests and 30% from imports, so farms will continue to lead in timber production (Dehradun workshop outputs). FSI reports on farm tree cover as TOF (trees outside of forests) and foresters estimate that tree cover in agroforestry systems is about 8%. Agroforestry systems, with fast growing trees, are likely to offer the highest carbon sequestration value per hectare of any of the Green India components except mangroves.

Other components discussed here all take place on the forest estate (protected, reserves and unclassified forests) while the agroforestry component is on agricultural and private land. The FRA also will add more land to this category (i.e. move from the forest estate to "private" cultivated land). There is scope here for private sector involvement and investment. Contract farming exists in India where private companies provide planting material, technical assistance and a guaranteed market for produce—this can be extended to fast growing tree species to provide local wood and fiber to the private sector (World Bank 2006). There are fewer disincentives for the farmer in this component than the components under direct FD control. However, the regulatory barriers for felling, transport and marketing of timber products are still burdensome but can vary by state.[7] Opportunities for "sparking" expansion and improving agroforestry systems include:

- Improved genetic stocks to enhance productivity (i.e. shorten rotations)
- Improved silviculture (including information on fertilizer needs)
- Removal of restrictive regulation on felling, transport and marketing of farm timber
- Organization of farmers to aggregate supply and improve bargaining power
- Explore value-added options for wood at community level
- Incorporation of private sector in provision of planting stock, extension services and markets
- Accessing credit markets for capital

Although SL funds could probably not be used for activities under the agroforestry component, support for agroforestry activities in the field could be folded into other USAID programs (discussed in section below).

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[7] "Recognizing the constraints to private forestry, an attempt was made in the state of Madhya Pradesh to deregulate for long rotation species as well, for farmers willing to get management plans in place for their forests prepared by a chartered forester. Lok Vaniki or Peoples Forestry is governed by the Madhya Pradesh Lok Vaniki Rules 2002, issued under Section 11 of the Madhya Pradesh Lok Vaniki Adhiniyam, 2001. The rules provide requirements for managing "tree clad" areas on private lands and revenue lands. A key provision of the rules is that farmers who develop management plans to manage their forests under Lok Vaniki are provided a regulatory waiver from the web of pre-existing rules governing harvesting of trees on private lands . Lok Vaniki is designed to motivate farmers to think of long term forest management and not one time harvest and conversion of land use. In Dewas, on private forests –mean annual increments (MAI) can reportedly be increased from 0.46 to 1.5 m3/ha with scientific management. In the few districts in MP where several hundred forests have been brought under management, farmers have benefited from harvesting their long standing trees, predominantly of teak. The real policy attractiveness of the Lok Vaniki program is that it has the potential to double state timber output without any investment by the state government and also increase returns to farmers, besides contributing to carbon sequestration and other local environmental benefits. Large-scale implementation would also free up scarce government resources as less regulatory oversight would be required. Little streamlining, the Lok Vaniki program can dramatically enhance the investment climate for small scale private forestry, lead to an increase in planting, sustainable management, and increased supply of timber from extensive forests outside FD forest land." (MoEF, 2009, endnote ix)

SECTION 9 - OPPORTUNITIES AND OPTIONS MENU FOR USAID/INDIA SUSTAINABLE LANDSCAPES INTERVENTIONS AND PROGRAMMING

The GIM focuses on adaptation and mitigation issues related to climate change with a strategic focus on enhancing ecosystem services such as carbon sequestration and storage in forests and other ecosystems, hydrological services, biodiversity and goods and services provided by natural ecosystems including fuel, fodder, small timber and NTFPs.

Keeping this GoI perspective in mind as well as the operational parameters under the Sustainable Landscapes pillar of USAID and the U.S. – India Strategic Dialogue, options are outlined below for potential USAID engagement with the GoI on REDD+ issues under a broad science and technical collaboration umbrella. The GoI requests for USG assistance are focused on scientific exchange and technical collaboration rather than traditional development support reflecting a new focus and relationship with the Indian Government and partners. Therefore, the options presented below are science and technology oriented with related capacity building. Field opportunities also exist by applying science to field studies of new methodologies and technical packages.

Options are presented, in priority order, by overarching thematic group:

1) National REDD+ Dialogue and Actions;

2) Developing Reference Baselines; and

3) Enhancing Multiple Forest Values

Related capacity-building activities are presented within each theme. Collaboration options with the REDD+ cell in the MoEF is the critical point of contact and main vehicle for the relationship between USAID/India and MoEF, with the FSI as point of contact for carbon monitoring. The Reference Baseline work option involves FSI and state collaborators as well as various MoEF research institutes for carbon modeling and estimates. The Enhancing Forest Values options are science-based and experimental in nature, seeking to increase the effectiveness of the GIM components through improved genetic material, innovative approaches to tackle root causes of forest degradation, and documentation of models to increase community incentives for sustainable natural resource management. Potential research opportunities are collaborative with MoEF research institutions and other regional or US scientists as well as participatory involving state forest departments and communities. A Summary Table of Options (Table 7) at the end of this section summarizes the options presented and indicates how they align with GoI priorities.

Thematic Group 1 - National Level REDD+ Dialogue and Actions
Many countries are in the initial stages of crafting REDD+ strategies and programs and all struggle over how best to engage a broader stakeholder base in constructive dialogue. Some potential opportunities for USAID programs and interventions are indicated below.

Partner or collaborate with the new REDD+ Cell of the MoEF. This could include the following types of support (but would need further discussion directly with MoEF)

• Fund a senior level science advisor to the cell

• Provide a research fund and mechanisms to carry out the other 2 overarching themes, to be identified through a joint planning process

• Provide logistical support and funds for national forums, regional meetings, and stakeholder outreach

Supporting a non-government platform for REDD+ dialogue

• Conducting an outreach, communication and education program aimed at specific stakeholders (tribal groups, women, Forest Development Committees[8], NGOS, local governments) to raise the level of understanding about REDD+ and carbon markets so that a broader sector of society can join the debate on the future and shape of REDD+ in India. Elements of such a program could include partnering with a local organization/institution such as a NGO, think tank or university to host a neutral platform from which a series of outreach and communication campaigns are carried out and who can serve as a forum for discussion and debate. Experiences from other countries with REDD+ and the voluntary carbon markets can be shared.

• Support NGOs in awareness building of the Community Forest Resource (CFR) provision of the FRA in order to mitigate individual claims.[9]

Thematic Group 2 - Improving the Development of National Reference Baselines for REDD+ Activities

On the monitoring and inventory front, as presented in Section 4 (Forest Monitoring and Inventory) of this Assessment Report, options are prioritized into three broad categories in order of importance based on criteria such as: 1) achieving the greatest impact with minimal cost; 2) most impact at the national level since REDD+ reporting will eventually have to be a national level effort; 3) GoI need, and because the option may have a significant impact on increasing carbon sequestration while reducing emissions. These are fundamental issues that will need addressing in order to develop sound national baselines through improvement of GoI's National Forest Inventory. These can be standalone options or as bundled elements dependent on funding levels and timely opportunities:

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[8]   FDCs are groups of JFMC at the district or higher level.

[9]   Increasing community or individual land ownership might complicate REDD implementation since there are not existing benefit-sharing mechanisms within community forests, unlike the benefit-sharing system of JFMs with state and national governments. Andhra Pradesh is currently transitioning some of its JFMs to CFRs (Winrock, personal communication) so more information is probably available at the state level on anticipated impacts of the transition.

Improved sampling design

- Improve sampling designs for REDD+ through a workshop and training would be a useful way to demonstrate that there is a need for intensified sampling before engaging fully on a REDD+ framework.

Integrating remote sensing and ground level measurements

- Collaborate on using ground level inventory data and remotely sensed data to improve estimates at the plot level as forest carbon cannot be measured directly from remote sensing but is derived from allometric relationships in combination with on-the- ground sampling (Macauley et al. 2009, Fagan and Defries and references therein)

Developing cost effective tools and technologies for the NFI and local levels

- Collaborate on development of cost-effective, easy to use tools and methods and spatially resolved accurate data gathering at local levels may be needed to expand focus to all land classes, regions and carbon pools.

- Collaborate on improving sampling methodologies to meet needs at the State and local levels because for project level implementation of terrestrial carbon management, detailed location specific information must be collected to predict, measure, and document the carbon outcomes of changes in land management.

Capacity-building

The GoI through its various institutes and its long-standing forest inventory infrastructure has the basic expertise that a number of developing countries are lacking at the higher national levels. However, for REDD+, a considerable amount of capacity and institutional infrastructure building will be required as GoI gets ready to finesse its existing inventory methodologies and look at the carbon sequestration perspective of forests in the REDD+ context.

Capacity building will need to happen both at the NFI level within MoEF's various institutions and at the State and local level where carbon and ecosystem services data will be fed up to the national level so benefits are realized at the community level. Trained manpower is required both in conducting the NFI and at the grassroots level. In addition, there is also a need for institutional capacity building. There is a need for basic infrastructure for inventory and monitoring (laboratories for soils analyses, remote sensing, and wood carbon analyses among others) and trained staff at the State level.

At present in the North East there is one State (Mizoram) that has the institutional capability to use remotely sensed data. It would be useful to collaborate with other donors (e.g. JICA, who typically funds large-scale infrastructure projects like facilities) to meet perceived needs in states with a high forest cover and with low institutional capacity and lack of trained manpower.

Given USAID's expertise and the parameters defined by the Sustainable Landscapes program, there are two specific actions that need to be addressed to build the GoI's Capacities in the REDD+ area:

- Carry out capacity-building at the State level where there is a need for trained staff dedicated to carrying out periodic forest inventories

- Carry out capacity-building of frontline Indian Forest Service personnel (forest officers, rangers and forest guards) to raise their awareness on climate change related issues and to provide training on a host of natural resource management, carbon and REDD+ related issues

Improving communication, information and data networks

Improving communication, information flow and data networks are common problems both in developed and developing countries. As pointed out by technical experts in Dehradun, in India, for REDD+ to work they will need addressing in the near term. Both near term needs as well as longer–term needs will need to be addressed in this area.

The REDD Cell that is being currently formed will likely address issues related to conducting a national dialogue on REDD+ issues to increase awareness as well as to disseminate relevant data and climate change related information in a timely fashion. For example, in the natural resources sector, making climate related information such as precipitation patterns, drought predictions, extreme events, available will need to be addressed both nationally and regionally within the country). Two key areas for near term actions which would likely show quick results would include:

- Improve the information infrastructure by making GoI project level information and carbon estimates and methodologies available on REDD+ related issues. Collaboration on expanding and building regional and global networks can provide needed linkages across field research and technological advancements and facilitate access to tools, databases, technical support, infrastructure and extension services.

- Collaborate on efforts to improve convergence and consistency to produce synthesized scientific knowledge, harmonized reporting guidelines and methodologies, compatible terminology, definitions, classifications and integrative modeling.

Thematic Group 3 - Enhancing Multiple Forest Values

The objective of the activities under this group of options is to improve the effectiveness, success and impact of the GIM components. The approach is to improve the technological packages that the MoEF and GoI are promoting across the forest areas. Improvements include biophysical innovations as well as socio-economic approaches tailored to increase incentives for greater community participation and to address root causes of forest degradation.

Applied research on productivity and impacts of climate change on forested ecosystems as well as research on socio-economic issues related to natural resource management and use would be critical to making the REDD+ strategy a success in India.

The options for studies and research which could potentially be supported are organized into broad categories (in order of priority) with some illustrative examples below each one.

Enhancing GIM forest carbon technology packages (both from a bio-physical and incentives perspective)

- Research innovative, community-implemented approaches to excluding livestock from forests. Examples of such activities could include fodder farming and collection, stall-feeding of livestock, manure collection, community enforcement mechanisms and measurements of changes in natural regeneration as well as livestock health and production;

- Conduct participatory research on techniques to manage non-timber forest products such as fodder, bamboo, medicinal plants to feed into community identified management rules and enforcement to ensure sustainable harvests;

- Collaborate on techniques to improve on productivity and carbon sequestration potential using improved genetic stocks, collaboration on new management techniques to improve above and below ground carbon estimates. Demonstration plots using improved stocks under different management regimes might be useful in starting to develop reference plots for different interventions in different physiographic zones;

- Collaborate on using improved and alternative management techniques and methods that are geared to help increase productivity, capture and storage of carbon but do not require energy intensive inputs such as fertilizers. A wide variety of land management practices have been shown to be effective at maintaining and enhancing carbon and contributing to mitigation (IPCC, 2007). Application of practices commonly associated with sustainable land management may generate co-benefits such as greater resilience to shifts or increasing variability in climatic conditions (Stickler et al. 2009);

- Collaborate on ecosystem science and management with particular emphasis on climate change induced stressors that affect productivity and decrease resilience of ecosystems for e.g. pest, pathogens, fungi, insects, invasive species, which have major impact on productivity and hence carbon sequestration in forests;

- Establish networks of permanent benchmark field sites for ongoing monitoring of soil carbon and related properties could improve the consistency of research and estimation efforts (Paustian et al. 2006) and enable comparison of improved management outcomes with baseline measurements (FAO, 2009; TCG 2010).

Quantifying multiple values from forests

- Over several pilot sites, quantify the full range of products and values generated by the forest. In collaboration with well-managed JFMC, state foresters and ICFRE, activities could include:

  o Work closely with ICFRE to identify and pick appropriate communities located within or adjacent to a forested area;

  o Scientists measure ecological services such as water catchment and production as well as carbon values. The total net value per hectare generated by these studies will help

the MoEF to more fully communicate the contribution of the forest estate to state and national GDP.

- o Train community members to track offtake of fodder, NTFPs, fuelwood, etc in order to help quantify the full value of forest products.

- o Pilot use of other ecological services to provide incentives to communities for forest management and protection, such as water (see Agarwal et al., 2007 for pilot PES water programs in India).

Enhanced community benefits through participatory methods

In addition to science-based interventions, activities that enhance participation of local communities in field testing of new methods and technical packages are essential to raise awareness at the state and national level of the importance of community participation.

- Involve communities in testing of new 'technical packages' for afforestation in degraded lands

  - o Increase community incentive by including important species (fodder, fuel, and NTFPs) in packages

  - o Train communities in proper planting, maintenance, and monitoring (could include prevention/minimization of grazing through community monitoring)

  - o Monitor survival and other success indicators to report up

- Involve communities in project-level forest inventory and monitoring

  - o Develop simpler methodologies for data collection

  - o Develop of a manual that could be used by people with low literacy

  - o Conduct capacity-building/training in methodology

Capacity building at national and state government levels

Involving state level foresters and research institutions in the pilot sites and testing will help to build capacity for data collection, management and analysis. Discussions of results and how they should influence work plans and work activities should also be incorporated. Further training and capacity building could be achieved by linking with regional centers like the Center for People and Forests (RECOFTC) and the Center for International Forestry Research (CIFOR) to provide short-term training to government staff on community forestry and how to increase community participation in overall forest management.

Table 7. Summary Options Table

Thematic Group/Opportunity	Intersection with GoI Priorities	Main Potential Partners
1. National REDD+ Dialogue and Actions a. Supporting REDD+ Cell b. Supporting non-govt platform for REDD+ dialogue	a. Green India Mission action	a. MoEF b. NGOs, Donors, IOs
2. Development of Reference Baselines a. Improved sampling design b. Integrating remote sensing with ground data c. Develop cost effective tools for data-gathering d. Improved data mgt and availability e. Capacity-building	a. MoEF science priority b. MoEF science priority c. MoEF science priority d. MoEF science priority e. MoEF science priority	a. FSI b. FSI c. FSI, States d. MoEF, FSI, ICFRE e. FSI, IFS, State FD
3. Enhancing Multiple Forest Values a. Enhancing GIM afforestation tech packages b. Quantify multiple forest values (ecosystem services) c. Enhance community benefits through participatory methods d. Capacity building	a. GIM priority, MoEF science priority c. GIM priority d. MoEF priority	a. MoEF, States b. ICFRE, States, JFMCs c. MoEF, States, JFMCs d. State FDs, JFMCs, MoEF, Min. of Tribal Affairs, NGOs, Villages

Synergy with Other USAID/India Programs

Due to a rigorous workshop and meeting schedule and travel to Dehradun, the assessment team had very little time and interaction with USAID/India so this section is a light overview and more discussions between USAID/India and the design team would be useful. The largest potential for synergies lay with other GCC pillars—adaptation (for agroforestry, livestock and water management) and clean energy (on MRV, LEDs, biofuels, and cook stoves).

Food for the Future and Adaptation funds

Our understanding is that these funds are being programmed together for an integrated farming systems approach focused on the Hindi Belt states which did not benefit from the Green Revolution activities several decades ago. The program will be promoting new crops, cropping mechanisms and promote water savings. There is a NRM component to the program. There could be scope to also consider development of public/private partnerships for agroforestry and farm forestry, stall feeding of livestock to reduce pressures on forests, domestication of NTFPs on farm land and watershed management.

Clean Energy

The Clean Energy activities explicitly identify an economy-wide emissions MRV system that includes both industrial and forestry emissions sources and sinks. Forest MRV systems could benefit from energy sector work and vice versa.

There is a potential synergy with the alternative fuels and efficiency components of end-use technologies and financing of clean energy which may have rural application to Sustainable Landscapes by taking pressure off forest biomass sources for cooking fuel and heating.

Biofuel plantations that meet both renewable energy objectives under Clean Energy as well as livelihood and afforestation objectives of Sustainable Landscapes could be a source of synergies or a source of conflict. If biofuel plantations drive land users to forests, there may be increased deforestation or degradation. Close coordination between these two components is critical.

Health – Cook stoves

The Ambassadorial initiative of more efficient biomass cook stoves to improve indoor air pollution could also have synergies with Sustainable Landscapes to the extent that the more efficient stoves require less biomass and thereby reduce pressure on forests.

Water

In the context of anticipated water scarcity exacerbated by climatic stress, the forest-water nexus may present an opportunity to coordinate for optimal benefit. Using Sustainable Landscape funding for watershed management provides a missing element that cannot be covered with the WASH earmark.

The Mission recently programmed a modest water supply and sanitation project that looks at climate variability and optimizing water supply and sanitation through piloting multi-use systems in rural areas. To the extent that water is an explicit bundled value that will be managed in addition to carbon under Sustainable Landscapes, there could exist strong synergies between the forested watershed activities and downstream rural and water users.

Gender/Women's Empowerment

There was unanimous consensus of both the NGO and Donor consultation of the importance of women to successful community forestry initiatives. Areas to be considered include: 1) the representation of women as part of the governance structure of JFMC and the Panchayat systems; 2) benefits equity mechanisms that recognize the role of women; 3) livelihood strategies that are appropriate to women; and 4) business development skills as needed.

Technical Expertise and Partnerships for USAID SL Program in India

There is a wealth of technical expertise in India from MoEF Institutes (outlined in Table 4 of Section 4), other NRM related ministries as well as national and regional NGOs. Field level donor projects can offer platforms for research and experimentation. A larger challenge will be to identify the sources of scientific expertise in the US which would be most useful and identifying mechanisms to tap into them. This can range from US Government agency expertise to universities to private individuals.

As expressed earlier, further discussions and engagement with the USAID mission and relevant partners and stakeholders will help to further elaborate a Sustainable Landscapes program for India.

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ANNEXES

Annex 1: Forest Cover Map of India (FSI)

Annex 2: Forest Cover Changes Map of India (2005 - 2009; FSI)

Annex 3: Forest Type Map of India

Annex 4: GoI Framework for REDD+ and Green India Mission Strategy

Annex 5: List of Individuals and Experts Met

Annex 6: NGO Workshop Participant Invitation List, June 15, 2010
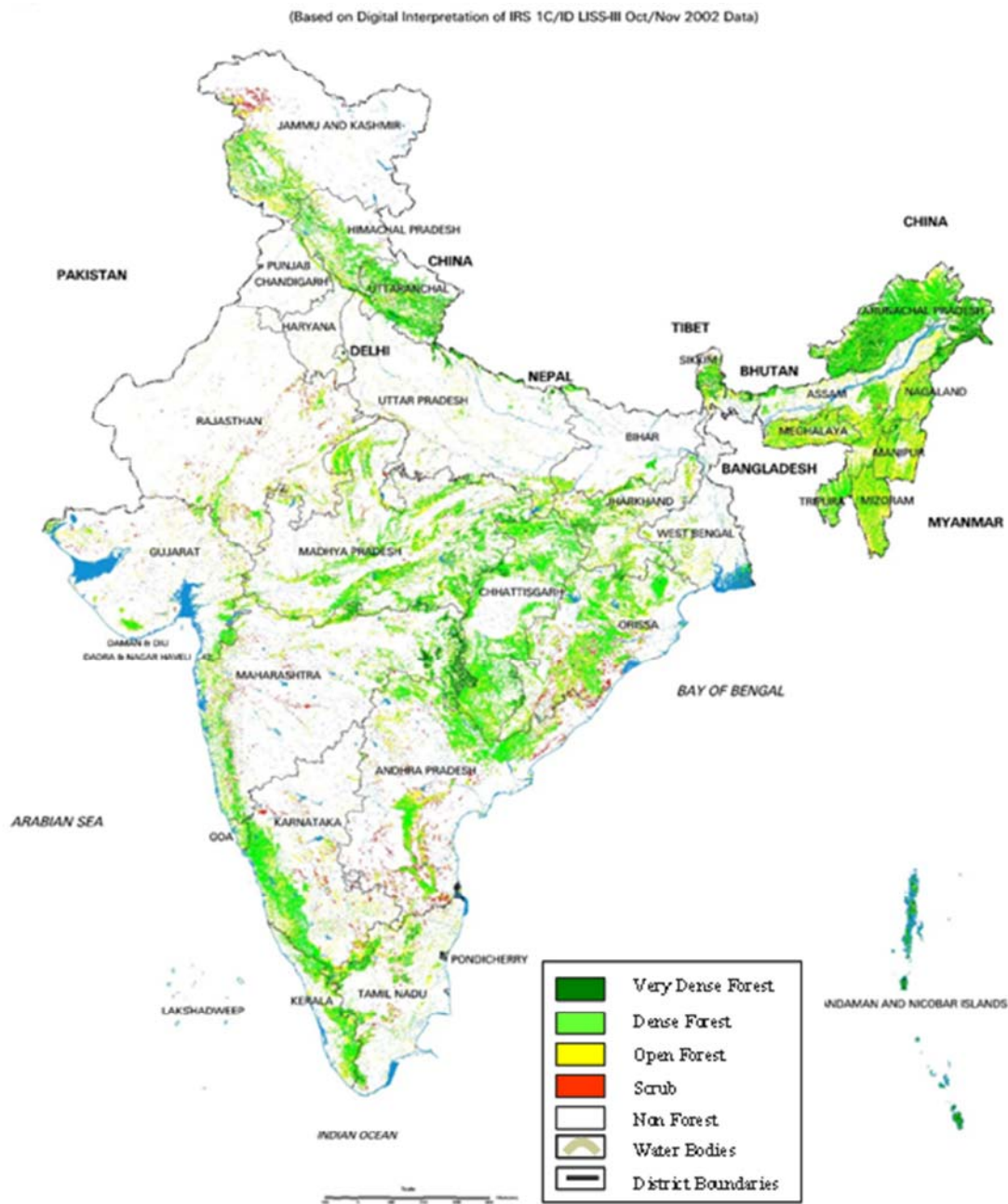
Annex 7: Donor Workshop Participant List, June 16, 2010

Annex 8: Dehradun Foresters Workshop Participant List, June 21, 2010

Annex 9: NE Foresters/MoEF Meeting Discussion Participant List, June 25, 2010
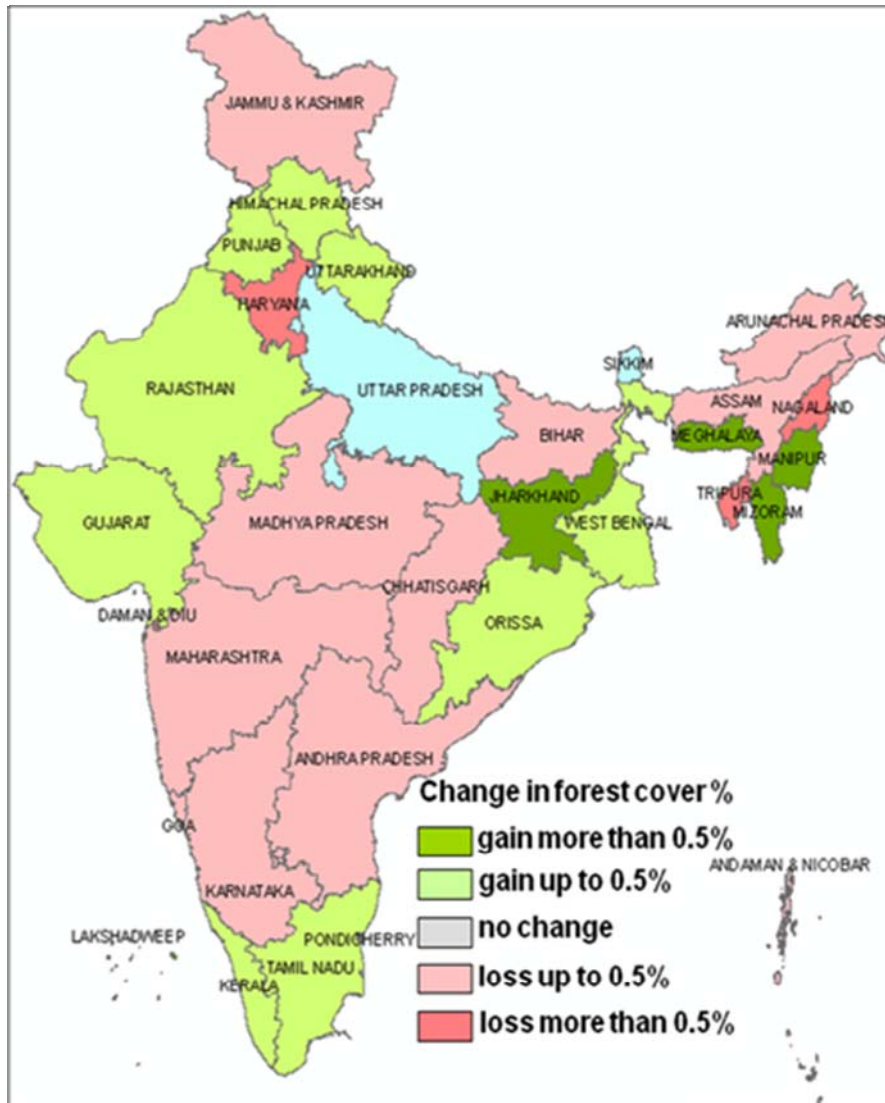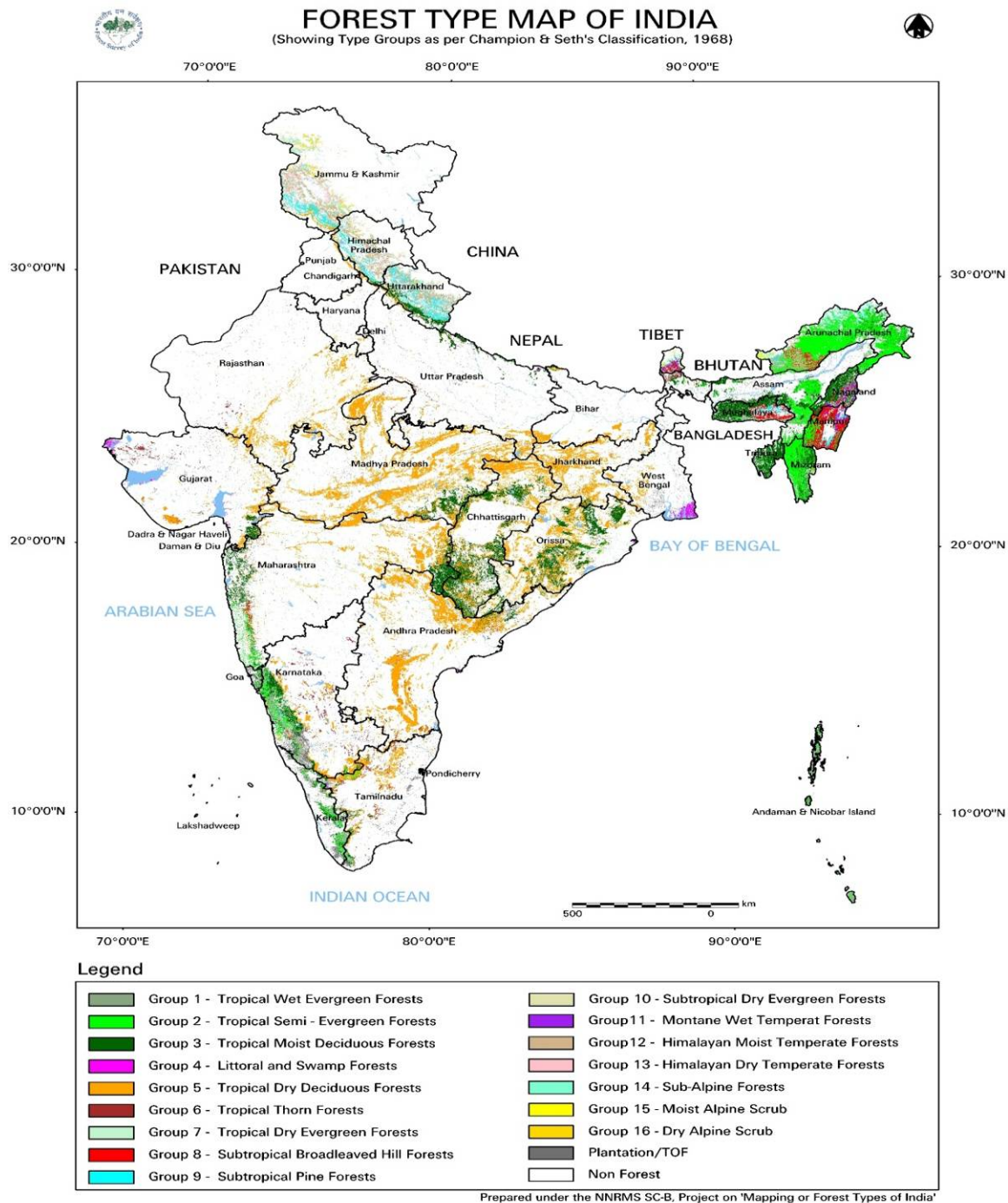
ANNEX 1

FOREST COVER MAP OF INDIA (FSI, 2009)

(Based on Digital Interpretation of IRS 1C/ID LISS-III Oct/Nov 2002 Data)

ANNEX 2

FOREST COVER CHANGES IN INDIA (2005 – 2009)

ANNEX 3

FOREST TYPE MAP OF INDIA

FOREST TYPE MAP OF INDIA
(Showing Type Groups as per Champion & Seth's Classification, 1968)

Legend

Group 1 - Tropical Wet Evergreen Forests	Group 10 - Subtropical Dry Evergreen Forests
Group 2 - Tropical Semi - Evergreen Forests	Group 11 - Montane Wet Temperat Forests
Group 3 - Tropical Moist Deciduous Forests	Group 12 - Himalayan Moist Temperate Forests
Group 4 - Littoral and Swamp Forests	Group 13 - Himalayan Dry Temperate Forests
Group 5 - Tropical Dry Deciduous Forests	Group 14 - Sub-Alpine Forests
Group 6 - Tropical Thorn Forests	Group 15 - Moist Alpine Scrub
Group 7 - Tropical Dry Evergreen Forests	Group 16 - Dry Alpine Scrub
Group 8 - Subtropical Broadleaved Hill Forests	Plantation/TOF
Group 9 - Subtropical Pine Forests	Non Forest

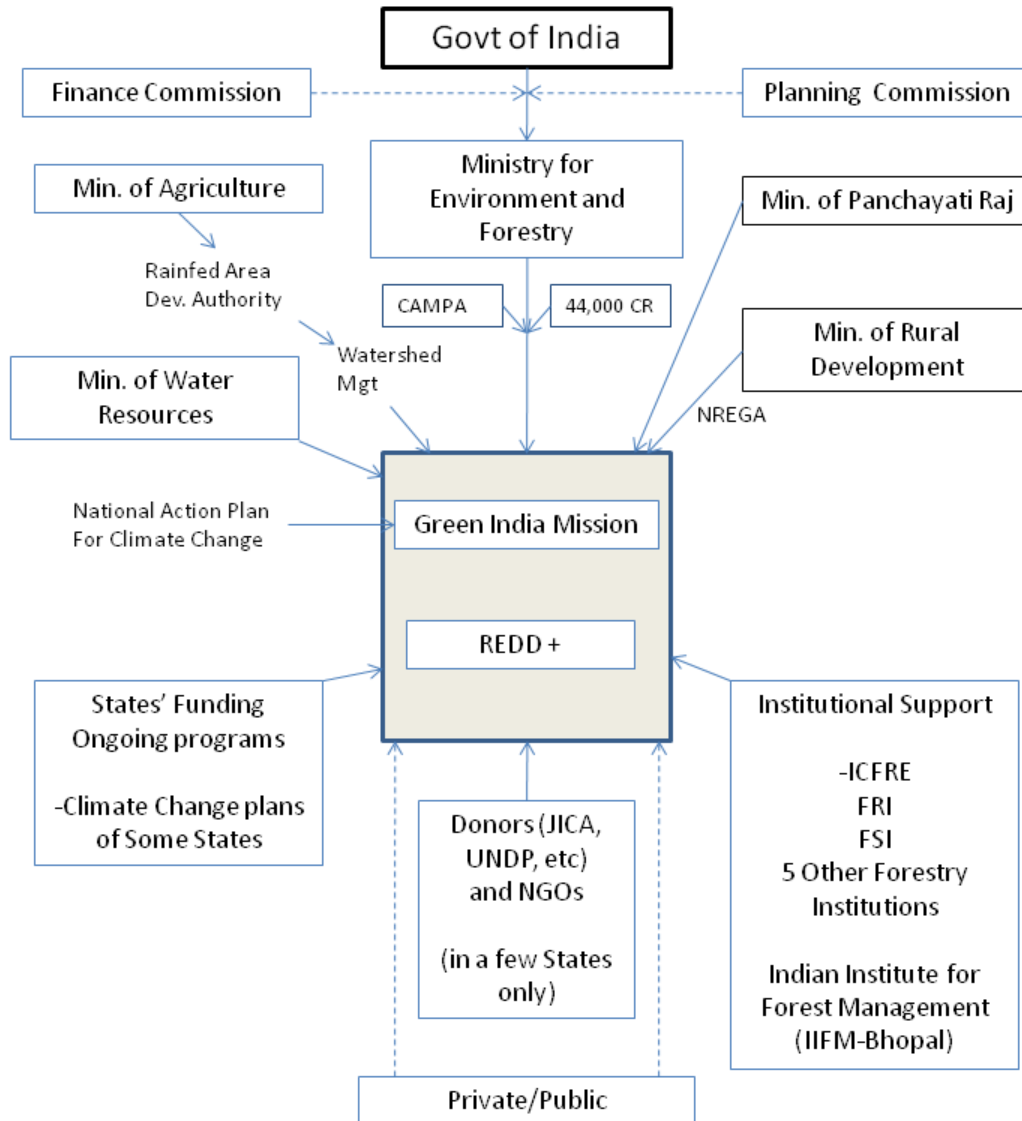Prepared under the NNRMS SC-B, Project on 'Mapping or Forest Types of India'

ANNEX 4

GoI Framework for REDD+

ANNEX 5

List of Individual Meetings with Experts and Officials

(Various times/dates)

DATE	NAME	ORGANISATION	ADDRESS	EMAIL
17-6-10	**Dr.P.S.Roy Dean,IIRS,**	Indian Institute of Remote Sensing	IIRS,Indian Space Research Organisation 4,Kalidas Road, Dehradun-248001 India	psr@iirs.gov.in
17-6-10	**Dr. Mrs. Prafulla Soni Scientist G and Head Ecology & Environment**	Forest Research Institute Dehradun-248006 India	Indian Council of Forestry Research Institute, P.O.New Forest, Dehradun-248006	Sonip1405@gmail.com sonip@icfre.org
18-6-10	**Dr. S.P.S.Kushwaha Scientist – 'SG'(Head of Division)**	IIRS	IIRS,4,Kalidas Road,Dehradun -248001 India	spskushwaha@iirs.gov.in
18-6-10	**Dr.R.D.Jakati Director IGNFA,**	Indira Gandhi National Forest Academy	IGNFA, P.O.New Forest ,Dehradun-248006 India	Jakatis654@yahoo.co.in
18-6-10	**Ms. Anu Nagar Associate Professor**	Indira Gandhi National Forest Academy	IGNFA, P.O.New Forest ,Dehradun-248006 India	anu.nagar@yahoo.co.in
18-6-10	**Mr.Shashi Paul Associate Professor IGNFA, Dehradun**	Indira Gandhi National Forest Academy	IGNFA, P.O.New Forest ,Dehradun-248006 India	shashipauls@yahoo.co.in
18-6-10	**Mr. Subhash Ashutosh Additional Professor IGNFA, Dehradun**	Indira Gandhi National Forest Academy	IGNFA, P.O.New Forest ,Dehradun-248006 India	Sashutosh30@gmail.com
18-6-10	**Dr.Renu Singh Head, BCC Division ICFRE, Dehradun**	Indian Council of Forestry Research and Education	ICFRE P.O.New Forest Dehradun-248006 India	renusingh@icfre.org head_bcc@icfre.org

18-6-10	**Dr.Govind Singh Rawat Director General, ICFRE and Chancellor,FRI University ICFRE**	Indian Council of Forestry Research and Education	ICFRE P.O.New Forest Dehradun-248006 India	rawatgs@icfre.org
18-6-10	**V.R.S.(Vijay)Rawat Scientist Biodiversity and Climate Change Division Indian Council of Forestry Research and Education**	ICFRE	ICFRE P.O.New Forest Dehradun-248006 India	rawatvrs@icfre.org
18-6-10	**Dr.Anita Srivastava Scientist Biodiversity and Climate Change Division Indian Council of Forestry Research and Education**	ICFRE	ICFRE P.O.New Forest Dehradun-248006 India	srivastava@icfre.org
22-6-10	**HE Jairam Ramesh, Minister of State for Environment and Forests**	MoEF	Office of the Minister, Ministry of Environment and Forests, New Delhi	
22-6-10	**Jitendra Sharma Forest Conservator Lucknow**		Lucknow	jvsharma2000@yahoo.com
23-6-10	**Dr. Dipankar Ghosh Head, Eastern Himalaya and Tarai Programme**	WWF-India	WWF-India 172 Lodi Road, New Delhi-110003	dghose@wwfindia.net
23-6-10	**Dr. Virinder Sharma Environment and Livelihoods Advisor, Climate Change and Energy Unit**	DFID	DFID India, British High Commission B-28 Tara Crescent, Qutab Institutional Area New Delhi-110016	v-sharma@dfid.gov.uk
23-6-10	**Ms Clare Shakya Senior Regional Clima Change and Water Advisor DFID India**	DFID	DFID India, British High Commission B-28 Tara Crescent, Qutab Institutional Area New Delhi-110016	c-shakya@dfid.gov.uk

23-6-10	**Mr. Arif Hussain Programme Manager-Sustainable Development, Joint Climate Change and Energy Unit DFID India**	DFID	DFID India, British High Commission B-28 Tara Crescent, Qutab Institutional Area New Delhi-110016	
23-6-10	**Ms. Nidhi Sarin Policy Support Officer-Carbon Finance, Climate Change and Energy Unit DFID India, British High Commission**	DFID	DFID India, British High Commission B-28 Tara Crescent, Qutab Institutional Area New Delhi-110016	n-sarin@dfid.gov.uk
23-6-10	**Mr. Ranjan Samantaray Senior NRM Specialist, Agriculture and Rural Development Unit, South Asia Sustainable Development Department, The World Bank**	World Bank	The World Bank 70 Lodi Estate, New Delhi-110003	rsamantaray@worldbank.org
23-6-10	**Ms Reena Gupta NRM Specialist, The World Bank**	World Bank	The World Bank 70 Lodi Estate, New Delhi-110003	rgupta4@worldbank.org
23-6-10	**Mr. Muthukumara Mani Climate Change Specialist** **Senior NRM Specialist, Agriculture and Rural Development Unit, South Asia Sustainable Development Department, The World Bank**	World Bank	The World Bank 70 Lodi Estate, New Delhi-110003	mmani@worldbank.org
23-6-10	**Dr. Preeti Soni Head, Energy and Environment Unit UNDP**	UNDP	UNDP 55 Lodi Estate, P.O.Box 3059 New Delhi-110003, India	preeti.soni@undp.org

23-6-10	**Mr. Promod Krishnan Programme Analyst, Energy and Environment Unit UNDP**	UNDP	UNDP 55 Lodi Estate, P.O.Box 3059 New Delhi-110003, India	pramod.krishnan@undp.org
25-6-10	**Ilona Porsche Senior Technical Advisor Natural Resource Management Programme ,GTZ**	German Technical Cooperation(GTZ)	GTZ B-5/1,Safdarjung Enclave New Delhi-110029	Ilona.porsche@gtz.de
25-6-10	**Sanjay Tomar Senior Technical Expert-Climate Change Adaptation**	German Technical Cooperation(GTZ)	GTZ B-5/1,Safdarjung Enclave New Delhi-110029	sanjay.tomar@gtz.de
26-6-10	**Dr.Devendra Pandey Retired Director Forest Survey of India,also has expertise in remote sensing and GIS**			
26-6-10	**Dr.Jagdish Kishwan PCCF J&K State**		Jammu and Kashmir	
26-6-10	**Mr.Vijay Sharma Secretary MoEF**	Ministry of Environnment and Forests	New Delhi	

ANNEX 6

Invited NGO Workshop Participant List,   June 15, 2010

New Delhi

NGOs		
Name	**Organisation**	**Contact Details**
Dr. Bhanu	PGVS	9335910650, 2/258, Vikas Khand, Gomti Nagar, Lucknow
Shiraz Wazih	Gorakhpur Enviornmental Action Group (GEAG)	9415211006, Director – GEAG, M.G.College Road, 224 Pudilpur, Gorakhpur (U.P.)
Rajesh Kumar	People Science Institute (PSI)	People's Science Institute 252, Vasant Vihar, Phase-I Dehra Doon - 248 006 Uttarakhand, (India) Tel : 0135 - 2773849, 2763649 Fax : 0135 - 2763186
Nandini Chandra	The Energy and Resources Institute (TERI)	Darbari Seth Block, IHC Complex, Lodhi Road, New Delhi - 110 003, INDIA Tel. (+91 11) 2468 2100 and 41504900 Fax (+91 11) 2468 2144 and 2468 2145
George Varghese	Development Alternatives	Development Alternatives 111/9-Z, Kishangarh Vasant Kunj New Delhi - 110070 Tel : 011 2613-4103, 2689-0380 Fax : 011 2613-0817
Suresh Rohilla/ Anurag Danda	WWF	WWF-India, 172 B, Lodhi Estate, New Delhi- 110003 Tel: 011 2469 1226

Mihir Bhatt	AIDMI	9824051148, 411, Sakar Five, Near Nataraj Cinema, Ashram Road Ahmedabad - 380009, Gujarat, India Phone : +91-79-26586234, 26583607 Fax : +91-79-26582962 Ahmedabad
Bharati Chaturvedi	Chintan	Chintan Environmental Research and Action Group C-14, Lajpat Nagar New Delhi
Anoop Poonia	IYCN	IYCN, Greaker kailash New Delhi 9999652361
Shashikant Chopde	Winrock International India	Sr. Programme Officer Winrock International India 1 Navjeevan Vihar New Delhi-110017 Tel. No: +91-11-2669-3868
H.S Sharma	Global Innovators National Energy Consultant	1921/4, Urban Estate Gurgaon – 122001 Haryana Ph: +91-2326-886 Mob: +91-9873020599
Arvind Ojha	Urmul Trust	URMUL Bhawan, Near New Roadways Bus Stand Bikaner- 334001, Rajasthan Ph.:- 0151-2545097 (Res), 2523093 (off)
Annie George	BEDROCK	31. Mahalakshmi Nagar South Palpannaicherry Nagapattinam, Tamilnadu India. 611001 +91 468 252618, 0468 252579
Bharat Patwal	Institute for Development Support	Near Police Lane, Kandoliya Road Pauri Garwal-246001 Ph: 01368-221103
S. Sivaji	Sanghamitra Service Society	1/18 Krishna Nagar Vijayawada Krishna Dt. Andhra Pradesh Off: 08662554731 Cell: 9848128886 / 9848128886
Rupa Mukerji	Inter Cooperation	Hyderabad

Nisheeth Kumar	Knowledge Links	B-81, Ground Floor, Kaushambi Ghaziabad – 201010 Tel/Fax: (0120) 4377951
Sunita Narain	Centre for Science and Environment	Phone:+ 91-11-29955778 Director Centre for Science and Environment (CSE) 41, Institutional Area Tuglakhabad New Delhi - 110 062
	CEE	
Sanjay Vasist	CANSA	
	ATREE (Ashoka Trust for Research in Ecology and the Environment)	Liaison and Development office K-1 Commercial Complex Birbal Road, Jangpura Extension New Delhi 110 014 India 4375 0071
Anjali Jaiswal	NRDC	
Mark Poffenberger, Executive Director (Met in Washington, DC)	Community Forestry International, Inc.	Community Forestry International, Inc. 1356 Mokelumne Dr. Antioch, CA. 94531 Tel: 925-706-2906 Cell: 530-721-1440 www.communityforestryinternational.org
Nisha Agarwal	Oxfam India, CEO	Oxfam India , Plot 1, Community Centre, 2nd Floor (Above Sujan Mohinder Hospital) New Friends Colony New Delhi - 110 065, India Tel + 91(0) 11 4653 8000 Ext 125 email zubin@oxfamindia.org
Harjeet Singh	Action Aid	9810036864, Munirka, New Delhi
Tiny Sawhney	Aga Khan Foundation	
Frederika Meijer / Samir Bhattacharya	ICCO	H-16, Green Park Extension New Delhi -110 016
Mr. Sushant Agarwal	Director	CASA

Ray Kancharla	Save the Children	4th Floor, Farm Bhawan, New Delhi 14-15 Nehru Place,
Nina Elinger	DCA	011-26148279, 26148280 New Delhi
Dr. Belinda Bennet	CA	011-26268068 / 69 / 70 New Delhi
Julia Sanchez	National Campaign Coordinator	GCCA

ANNEX 7

DONOR WORKSHOP PARTICIPANT LIST, June 16, 2010

New Delhi

Donor List		
Name	**Organisation**	**Contact Details**
Mr. Rajeev Issar	BCPR	Lodhi Road, New Delhi
Virendra Sharma	DFID	B-28 Tara Crescent, Qutab Institutional Area,Tel:4279-3462
		Delegation of the European Union to India 49, Sunder Nagar New Delhi - 110 003 Phone: +91-11-24629237, 24629238 Fax: +91-11-24629206
Robert Donkers	European Commission	
J. Radhakrishnan	UNDP	Lodhi Road, New Delhi
Pradeep Kurukulasuriya	UNDP NY	Senior Technical Advisor Climate Change
Francois Binder	SDC	Swiss Cooperation Office India, Chandragupta Marg, New Delhi
Mr. Gavin Wall	FAO Representative	UNDP 55, Lodi Estate New Delhi-110003. Tel: 46532333 Fax: 24627612
	World Bank	Ranjan Samantaray Senior NRM Specialist Agriculture and Rural Development Unit, South Asia Region The World Bank, 70, Lodi Estate, New Delhi-110003 Tel: 91-11-41479463, Fax: 91-11-24632275

		Reena Gupta, NRM Specialist World Bank, India Email: rgupta@worldbank.org
	GTZ	GTZ- India Jens Burgtorf- Manager, Energy jens.burgtorf@gtz.de 4th Floor, Sewa Bhavan R.K. Puram, New Delhi-66 Ph No- 26179699 Fax-26178352
	JBIC/JAICA	Shinichi Yamanaka Chief Representative Japan International Cooperation Agency (JICA) Address: 2nd Floor, Dr Gopal Das Bhawan, 28 Barakhamba Road, New Delhi,110001, INDIA Phone: (91-11) 4768-5500 – 85 Fax: (91-11) 4768-5555

ANNEX 8

DEHRADUN WORKSHOP PARTICIPANT LIST, June 21, 2010

WORKSHOP ON REDD+

DATE: 21, 2010
VENUE: FSI, DEHRADUN

NAME	ORGANISATION	ADDRESS	CONTACT	EMAIL
N.S.Mathur	FOREST SURVEY OF INDIA(FSI)	Kaulagarh Road Dehradun	91-0135-2756180	Mathur_ns@rediffmail.com
Dhara Singh	FSI	Kaulagarh Road Dehradun	91-0135-2754191 ext234	Singh_dhara5@rediffmail.com
R.K.Chaturvedi	FSI	Kaulagarh Road Dehradun	91-0135-2754191	chaturvedirajivkumar@rediffmail.com
R.K.Bajpai	FSI	PO-IPE Dehradun-248195	91-0135-2751238 09412998274	rajkumar.bajpai@gmail.com
M.L.Srivastava	FSI	PO-IPE	9997792200	mukundsifs@gmail.com
R.D.Jakati DG FSI	FSI	DG FSI	09412057015	jakatis654@yahoo.co.in
S.Ashutosh	IGNFA	Addl.Professor	9760041814	Sashutosh30@yahoo.com
Rajesh Kumar	FSI	Kaulagarh road P.O.IPE Dehradun	91-09411101670	rajesh1@rediffmail.com
Sushant Sharma	FSI	Kaulagarh road P.O.IPE Dehradun	91-09411110764	sushantifs@gmail.com
Prakash Lakhchaura	FSI	Kaulagarh road P.O.IPE Dehradun	91-9412939806	Prakash_293@rediffmail.com
Prof.Dr.SPS Kushwaha	IIRS	Head Forestry & Ecology Division IIRS,ISRO	91-9411106224 91-0135-2524170	spskushwaha@gmail.com

ANNEX 9

NE FORESTERS & MoEF MEETING PARTICIPANT LIST

NE FORESTERS DISCUSSION ON REDD+

DATE: JUNE 25, 2010

VENUE: MoEF NEW DELHI

S.NO	NAME	ORGANISATION	ADDRESS	CONTACT	E-MAIL
1.	Yogesh CCF	Forest and Environment Deptt,	Secretariat ,Itanagar-791111 Arunachal Pradesh	09436049471	ymalik1955@gmail.com
2.	Anil Mania Addl. PCCF	Forest Environment &Wildlife Deptt.	Forest Environment and Wildlife Department Govt. Sikkim	09475076757	anil_mainra@yahoo.com
3.	Rebecca Butterfield	USAID Washington			rbutterfield@usaid.gov
4.	R.K.Goel	MoEF	MoEF		
5.	Dr.V.K.Bahuguna Technical Expert MRAA,MOA	Ministry of Agriculture	Ministry of Agriculture Government of India	91-9810013969 011-25842959	bahugunasifs@gmail.com
6.	Ansar Ahmed	MoEF New Delhi	1 GF (FC)MoEF New Delhi	91-011-24362698	Ansarahmed51@yahoo.com
7.	C.D.Singh Sr.AIG(FC),	MoEF,New Delhi	MoEF, New Delhi	91-011-24363984	Cdsingh1987@rediffmail.com
8.	H.C.Chaudhary AIG(FC)	MoEF	MoEF ,New Delhi	91-011-24361316	harishcc@yahoo.com
9.	Mohan Lal AIG(FP)	MoEF	MoEF,New Delhi	91-9650628522	dr.mohanlal@gmail.com
10.	Pankaj Garg	MoEF	MoEF,New	91-011-	Pankaj.garg@nic.in

			Delhi	24360686	
11.	Vinod Sharma	Professor,, IIPA	IIPA,New Delhi	91-011-23468324	profvinod@gmail.com
12.	Beth Lebow	US Forest Service	US		elizabethlebow@fs.fed.us
13.	Toral Patel Weynand	US Forest Service	US		tpatelweynand@fs.fed.us
14.	Greg Garbinsky Asst. Team leader(USFS)	US Forest Service	US		ggarbinsky@fs.fed.us

The top-left cell of the first row reads "Deputy Secretary(IC)".